ARCHITECTVRE
THE PROFESSIONAL ARCHITECTVRAL MONTHLY
VOL. XLVII MARCH, 1923 NO. 3

The Cathedrals of Apulia

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Holder of the Appleton Travelling Scholarship from Harvard University, 1920–1921

ARTICLE I

LYING northwest of Naples on the shore of the Adriatic is a province known as Apulia. That is, those who know it at all know it by that name. Most travellers who pass through it on their way to Brindisi or north via Foggia have little idea of the treasures that lie forgotten all along their way. It is only quite recently that even archæologists have taken an interest in this country, although H. S. Schutz, a German, compiled an elaborate treatise on Apulian architecture as long ago as the first half of the nineteenth century. Baedeker barely mentions a few of the cathedrals. The average tourist, and even student of architecture, never goes into this section of Italy. Yet, to cite an example, Goodyear writes of the Cathedral of Troja, "One of the greatest churches of Italy." "Not one trace of restoration to be seen on the splendid exterior—all intact—early twelfth-century work." "The interior is, to my mind, the purest and most genuine survival of an important church in the style of one period to be found in Italy." "Troja's architectural details offer the most remarkable mediæval survival of classic art to be seen in all Europe. The decorative details of its bronze doors (Fig. 2) are the finest mediæval metal work in Italy or in all Europe, judged from the standpoint of decorative art—although in figure design they are surpassed by the bronze doors of Trani (Fig. 3) (also in Apulia) and Ravello. Its rose window has no parallel in the art of Italy." Even those enthusiasts for northern Lombard Romanesque become so heated in proving how much Apulia got from the North, and how many of the beauties of the Lombard type it lacks, that one begins to wonder if there isn't really something pretty fine down there after all.

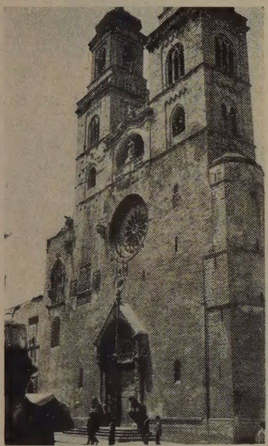


Fig. 6.—Cathedral of Altamura, west front.

That Apulia is a backward province is not to be denied. Even now, when there are no bandits and slow railroads ply, at least once a day, to most of the towns, the ignorance and excitability of the natives are surprising. Some students I know attempted a trip there in the spring of 1921, unfortunately just before elections, when the country was seething with revolution. They attempted to sketch, whereupon a mob gathered and the strangers were dragged off to jail. They were searched, and with difficulty proved that their cameras were not infernal machines, that they were not French, and that their American passports meant something. In the end they were permitted to leave town—but ordered out of town they were. A similar experience in three successive towns caused them to give up the trip.

When these students learned that they were going to Apulia, they predicted to us terrible things. We, however, elections being over, received only courtesy and kindness—

Fig. 1.—Tomb Church of S. Margherita at Bisceglie.

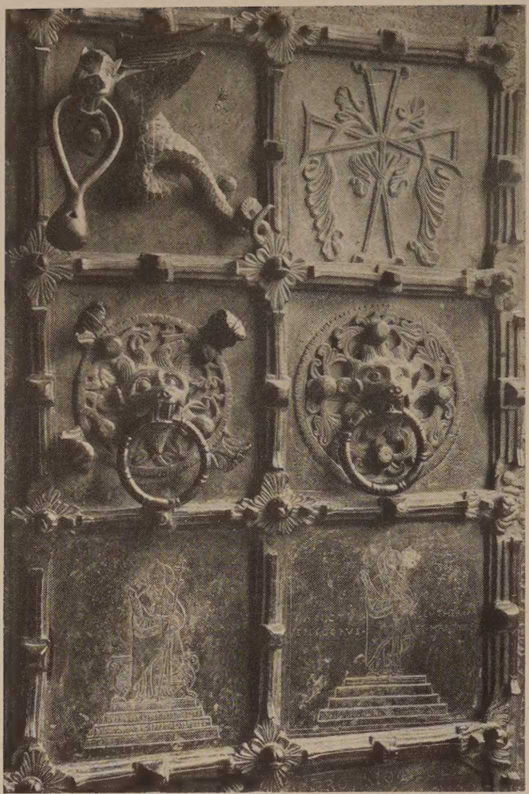


Fig. 2.—Cathedral of Troja, bronze doors.

if, perhaps, a trifle too much interest. One finds it difficult to concentrate with fifty people following as he sees a church. This was not always the case, but a sketch was invariably the signal for a gathering.

A large percentage of the Italians who emigrate to America comes from Apulia. They sell bananas as a rule. We found them simple people, and kindly disposed in general unless, of course, their suspicions were aroused. The existing poverty and squalor are unbelievable. One may be reasonably comfortable in Bari, but in the smaller towns the hotels, when they exist, are primitive in the extreme. All this accounts for the lack of enthusiasm on the part of tourists for Apulia and Apulian ways. Even in Bari, one crosses the street which divides the old and new towns; and he steps immediately out of the twentieth century into the Middle Ages. The two towns exist quite distinctly and separately—never intermingling. It is like passing through an arch on Broadway and finding oneself in the New York of 1776. There is an oriental quality about this Old Bari that I know of in no other part of Italy or Sicily. On three sides the Adriatic cuts it off from the world. One is reminded of Pompeii by the plans of these crowded dwellings. Whole families live crowded into one room, which opens directly off the narrow street. One sees curtained doorways, a multitude of balconies from which stream colored garments of all known hues, naked babies sprawling on the stone pavement, women in bright colors and gay shawls sitting in rows before their doors working or combing their black hair into wonderful headdresses or sometimes cleaning each other's scalps. Yet the squalor in general seems to be a clean squalor, the people happy and gay. At night mandolins and guitars, singing, and laughter are heard on every side over all that network of passages that are not streets and yet fulfil the functions of streets. In the centre of this curious city rise the cathedrals of Bari, San Gregorio and San Nicolà.

But before taking up an intensive study of the cathedrals it may be well to take a quick glance at the history which leads up to them. It will be remembered that the Lombards, or "Longbeards," invaded Italy at the end of the sixth century and during the seventh century expanded until they controlled almost all of Italy. In Apulia they found the language, customs, dress, etc., Greek, although the great Greek civilization there had long before passed away. Its tradition and influence were still shown in the artistic sense of the inhabitants—a fine sense for delicacy of carving and beauty of line. Under the Lombards, in the north and in the south of Italy, a new style of architecture suddenly sprang up—a fusion of the sterner northern nature with the traditions and craftsmanship of the Italians. In Apulia we have no trace of the early Greek work before the time of the Lombards. The early work done under them is scarce. Usually most of the churches handed down to us have been almost entirely or completely rebuilt at a later date on the site of an earlier church—San Gregorio at Bari may be cited as one of the least altered of existing early examples, dating from the eighth century. It has a simple basilican plan, a nave with aisles and three shallow apses on the respective axes. The aisles are divided from the nave by openings in two groups of three arches each, a pier with half columns separating the two groups. The aisles are vaulted in square bays, the nave wooden roofed.

In the first of the ninth century the edict of Emperor Leo against images in places of worship and his persecution of those who opposed him caused great numbers of Greek artists to leave the eastern empire and come to Italy. They arrived first in Southern Italy. There they were at home. It is true that they travelled far; we find them at Ravenna, at Venice, always beautifying wherever they went. With mosaic and with chisel, their refinement and experience were readily utilized all over Italy. It is used upon those stern northern edifices. But it was in the South that they were

Fig. 3.—Cathedral of Trani, bronze doors by Barisano.

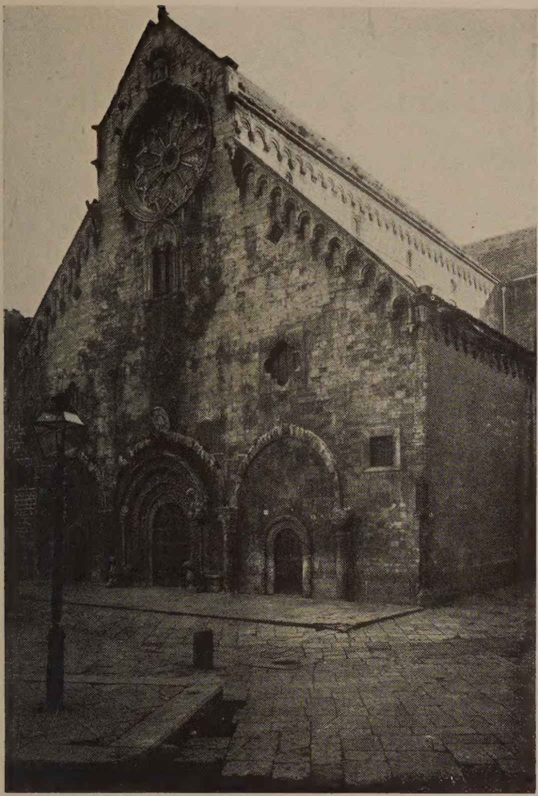


Fig. 4.—Cathedral of Ruvo, west front.

the most free, where their influence was the most felt. This influence continued for many centuries. As a rule, the fact that they were decorators inclined this influence to take the form of ornament rather than plan, although so little remains of the contemporary architecture that it is difficult to say that great and beautiful Byzantine churches did not exist. The cathedral of Molfetta ("dating not much later than 850," Cummings) may be cited as an example of the Greek influence in plan. There the nave is divided into three square bays by cross arches which spring from a pier with attached half column and corresponds to the arch between nave and aisles. These bays are covered by domes of which the central one is higher than the others. The aisles have half-barrel vaults. The other features of the church are not Greek, but follow the general type of Romanesque work in Apulia.

The Arabs or Saracens took Brindisi in 838, and Bari in 843, and held it for thirty years. They ravaged Italy to the gates of Rome. In 846 they sailed up the Tiber to Rome, but were finally driven away. In 876 Pope John VIII was forced to bow to them in order to save the city and to pay to them monthly tribute in silver. This invasion and devastation continued through the ninth and tenth centuries, but most of the little that the Saracens built was afterwards destroyed. The eleventh century marked renewed activity all over Europe.

In 1018 the Normans entered Italy. In 1043 they conquered Apulia. It was in the eleventh and twelfth centuries that the grandeur of Apulia was attained. It was then that the great churches were built or commenced. This phase may be said to have passed with the Hohenstaufens and the middle of the thirteenth century, although a few isolated bits are of a later date. The stagnation of the country since the thirteenth century, however, has permitted a great heritage of medieval art to come down to us in its original condition. Even the cathedrals that have been plastered over and rendered hideous internally with gilt and white seem to retain underneath the fine original work. In some cases, as at Matera, one sees the beautiful capitals of the columns exposed surrounded by the unfortunate later work. Too much cannot be said for the restoration which the Italian government is now undertaking. Marvellous things are being brought to light, and, as in the case of the restorations at Bari cathedral now in progress, some interesting discoveries are about to be given to the world.

The architecture in Apulia of the eleventh and twelfth centuries was not the creation of any one race. It was rather an amalgamation of influences, and, although resembling in various respects that of Lombardy, the Apulian architecture has so many characteristics peculiar to itself that it may be said to have developed along the same lines in certain respects due to a similarity of causes rather than to have been an importation from the North. The Lombards and after them the Norman impressed much of their stern vigor and bigness of conception into the work, but the actual execution was, in a large measure, left to the native Italians, who maintained throughout their adherence to the classic tradition as they continued to do even through the Gothic era.

The stone used in the Apulian churches is very much affected by weather, although a better grade seems to have been employed in some cases than in others. Low down on the walls where water splashes the masonry seems to have been especially disintegrated. At Troja the materials, many of them imported, and the masonry, especially the lower part of the church, are very much finer than is customary in most of the churches.

Perhaps the Southern work attained its greatest perfection in the church furniture, pulpits, bishops' thrones, ciboria like those of early Christian Rome, etc. All executed with a richness and delicacy seldom equaled. (Fig. 1.) Interesting as are these churches in plan and design, charming as are their proportions, it is above all in the ornamentation, the sculptured relief, the window and door enframements

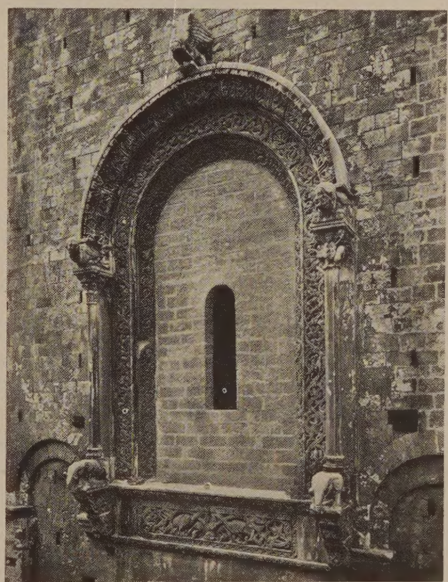


Fig. 5.—Cathedral of Bari, apse window on east façade.

(Fig. 5), as well placed enrichment that their unique beauty is achieved. There is an almost Spanish quality in the way in which the ornament is featured—in the spotting of interest upon a great blank wall.

The Chicago "Tribune" Competition—A Retrospect

By Alfred Morton Githens

"IS the architectural competition worth while?" Again the question arises, with vigorous affirmation and stout denial on the part of various contestants and interested observers.

The Tribune competition was noteworthy for its having had over two hundred contestants, for the variety of nationalities they represented, for its large cash prizes, and for the great size of drawings required. The programme was excellent, the contest fair, the judgment seemed absolutely honorable. Mr. Cheney deserves praise for successfully executing a difficult commission. But the large drawings were costly. A New York architect, experienced in competitions, computed the cost of his various competitive drawings to be directly proportional to area; that consequently a plan or an elevation drawn at eighth scale cost four times as much as if drawn at sixteenth. Though this may seem excessive, surely large drawings are a burden and either increase cost enormously or absorb time needed for study of the elemental scheme. Since The Tribune Building was pre-eminently a competition for an exterior, the large perspective, two-and-a-half by five feet, seemed not unreasonable; but front and side being shown thereon, two elevations and a section each as large seemed unnecessary. The plans could have been smaller. As it was, the programme required fifty-seven and a half square feet of drawings inside the border lines!

By Ralph Thomas Walker; McKenzie, Voorhees & Gmelin, Associates. Honorable Mention.

What did this competition cost? The editor of ARCHITECTURE sent a letter to many of the contestants, and he has sent me extracts from eleven replies without giving me any names or any possible clew to their authorship. Some of them were vague; others did not give costs. Since the successful architects are both abroad, their costs are unobtainable.

Among the others the range is startling. One (we will call him "A") gives: Actual disbursements, including salaries and direct moneys paid out, $3,410. Allowance for his own time, proportional rent, light, etc., $1,500. Total, $4,910.

"B" spent five weeks on the project, part time during the first two weeks, all his time during the last three weeks, with night-work as well; no draftsmen employed, no charge for rent or light submitted; so his figure represents direct disbursements only, and totals $40.

Both "A" and "B" received honorable mention, some of the others also; but I do not know which. They are as follows:

"C":	No charge for overhead nor for personal time; salaries and costs	$3,000
"D":	Salaries, costs, overhead, time	4,500
"E":	Unexplained	5,000
"F":	Unexplained	2,000
"G":	All the work done personally except laying out perspective and actual drawing of the two plans. No charge for overhead nor for time; salaries and costs	400
"H":	Entire work done by architect himself; no charge for overhead nor time; costs, less than	100

Of course it is unreasonable not to include overhead, and particularly a money equivalent of an architect's own time; for if it were not spent on this, it presumably would be spent on something that brought in a money return.

The average of these figures, for direct costs without personal time or overhead, would be somewhere near $1,750, which multiplied by 204 is over $350,000—money actually paid out! Of course this figure may not be anywhere near correct, for the competitors who have not replied may have averaged far less. Writers against competitions are accustomed to compare such a cost with the money return to the successful competitor, and argue that therefore competitions are an economic loss which any trained business man would appreciate and unhesitatingly condemn. They point out that such a figure represents only part of the cost, even leaving overhead and personal time out of consideration, since there is a further loss in the certain demoralization of the office force during the work. They take no account of the possible benefit to an architect in measuring himself against his brethren, nor do they recognize a stimulus to his creative imagination.

One of the correspondents states that he has "always maintained that no designer can produce the best that is in

him when working competitively. His designs necessarily take on the form of a special appeal, without any reference to a finished building."

Yet he considers the competition a fair business proposition: "Those who conduct competitions argue, and quite rightly, that over and above the cost of the drawings there is always the possibility of being successful. The truth is that one needs win only one out of a very considerable number to make the process pay."

Not so another: "I must say that 'return' on an investment of $3,000 plus the immense amount of work put into a competition does not pay. It is very unfair and unwarranted, and 'never again' unless I am to be compensated."

Another says: "In spite of troubles, we think competitions have a value to both owners and architects, and we are all for them. The cost is largely a matter of bookkeeping. In many cases office costs run on just the same, whether working on a competition or admiring scenery through the office window."

To one the double competition would have been preferable: "Our opinion is that in this particular competition a one-sixteenth-inch-scale rough perspective (giving parti) would have served every purpose in the open competition; then a paid competition between selected competitors and the open competition winners might very properly require more complete drawings. The effort expended on carefully worked out designs that were never looked at is something sad to think about. The reflection that some of these were probably the best makes it still sadder."

Another suggests a wider partition of the lesser prizes: "Those who received an honorable mention, or even those who entered the competition and who put in just as much work as the prize winners, should be at least reimbursed in some way; if not in cash, then by some medal or other emblem, that could be treasured for all time as a memento of his work. While the prizes were high and worth trying for, I believe that less amounts and more prizes would have accomplished the same results, thereby giving others, who took a chance in entering the general competition and were not invited or compensated, an opportunity to obtain some return for their efforts and expense."

Beyond these few suggestions, there was no criticism concerning the conduct of the competition; but in several of the letters was plainly seen a deprecation, at times a horror, at the total amount of work expended. The Tribune Building brings the competition problem no nearer a generally satisfactory solution; but one thing stands clearly forth beyond dispute, that a demand for unessential drawings or drawings unnecessarily large in scale is wickedly wasteful; as wanton as if good anthracite were purchased and dumped into the river!

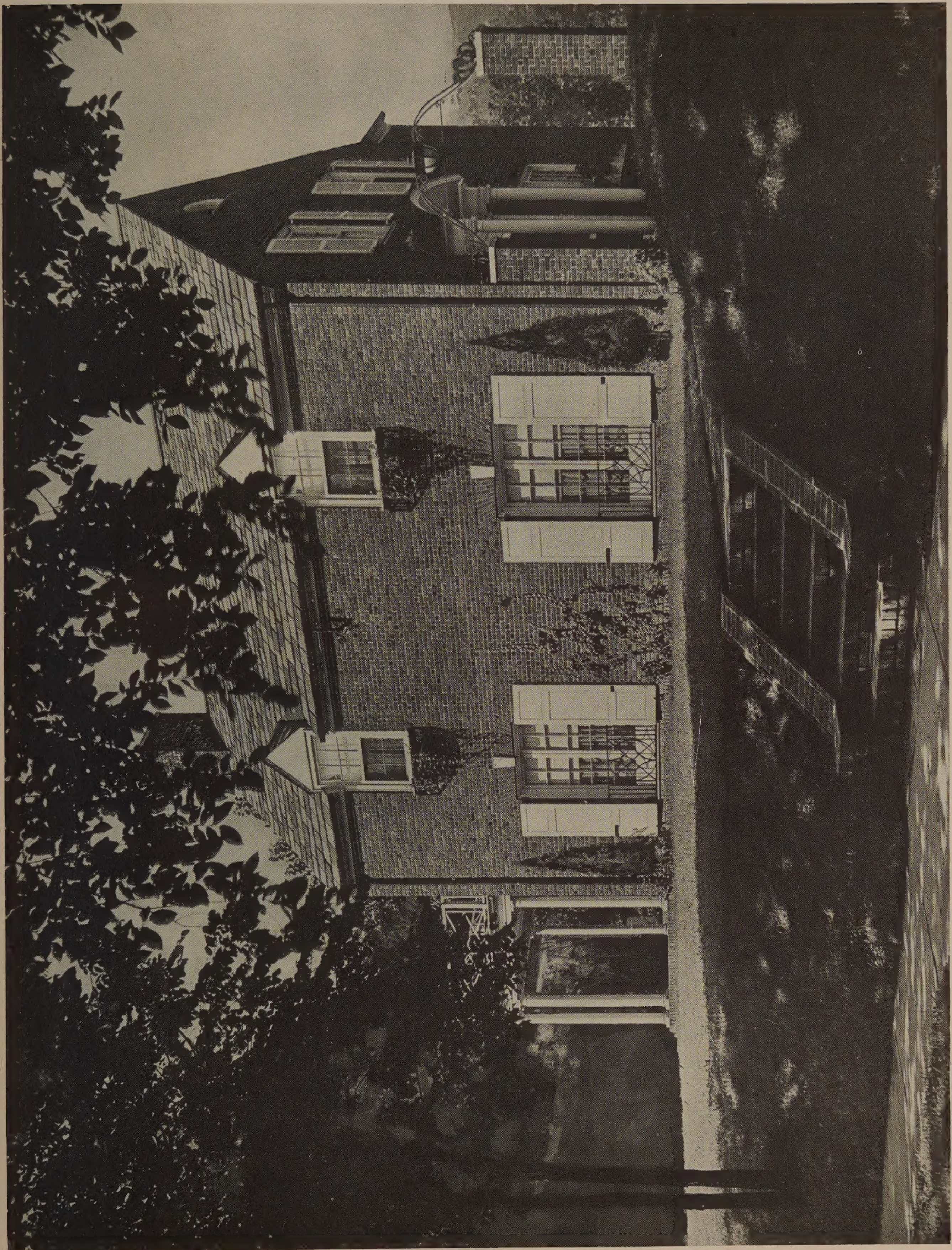
On other points there is not a general agreement. One is tempted here and now to analyze the suggestions made in the letters, to recapitulate the divers problems of programme writing, of eligibility of entrants, of single vs. double competitions, of open vs. limited competitions, of exact and detailed programmes of the "Laird" type vs. the somewhat vague freedom of the "Kimball" type. But that is a large matter and perhaps extraneous.

Honorable Mentions in the Chicago "Tribune" Competition

In response to a number of requests we publish below the complete official list of honorable mentions: 104, Arthur Frederick Adams, Kansas City, Mo.; 140, Benjamin Wistar Morris, New York, N. Y.; 47, Lucian E. Smith, New York, N. Y.; 141, Alfred Morton Githens, New York, N. Y.; 112, Louis Bourgeois, Francis E. Dunlap, Charles L. Morgan, Chicago, Ill.; 6, Albert J. Rousseau, Ann Arbor, Mich.; 83, Schmidt, Garden & Martin, Chicago, Ill.; 72, D. H. Burnham & Co., Chicago, Ill.; 78, Guy Lowell, Boston, Mass.; 111, A. N. Rebori, Chicago, Ill.; 143, James Gamble Rogers, New York, N. Y.; 127, B. H. & C. N. Whinston, New York, N. Y.; 115, Bertram Grosvenor Goodhue, New York, N. Y.; 132, Frank Fort, New York, N. Y.; 151, Charles H. Bebb, Carl F. Gould, Seattle, Wash.; 18, Claude Bragdon, Rochester, N. Y.; 23, Butler & Corse, New York, N. Y.; 171, Hutton & Taylor, Glasgow, Scotland; 33, Ernesto Fuchs, Guadalajara, Jal., Mexico; 41, Ralph Thomas Walker and McKenzie, Voorhees & Gmelin, Associates, New York, N. Y.; 54, Peter J. Weber, Chicago, Ill.; 60, Jarvis Hunt, Chicago, Ill.; 67, Hewitt & Brown, Minneapolis, Minn.; 76, Thomas J. George, New York, N. Y.; 85, Edmund S. Campbell, Chicago, Ill.; 95, George F. Schreiber, Chicago, Ill.; 97, Richard Yoshijiro Mine, Urbana, Ill.; 149, F. Lilpop and K. Jankowski, Warsaw, Poland; 150, Hugh G. Jones, Montreal, Canada; 156, Felix Cabarrocas, Habana, Cuba; 157, Joe Schartz, Luxembourg; 165, Otto Hoffmann, Vienna, Austria; 166, Friedr. Stumke, Berlin, Germany; 167, Nicolas Wassilieff, Belgrade, Serbia; 170, W. T. Gregory and B. H. Saunders, London, England; 174, Jules Vanden Hende, Gand, Belgium; 175, Barry Hammond Dierks, Paris, France; 177, Meischke & Schmidt, Rotterdam, Holland; 179, Pierre LeBourgeois, Nancy, France; 180, Professor Giuseppe Boni, Architetto Civile, Rome, Italy; 181, Olaf Boye, Crawford Jensen, L. W. Wilhelmsen, Kristiania, Norway; 182, L. Bode, Amsterdam, Holland; 185, Hermann Herter, Zurich, Switzerland; 186, A. Hamilton Scott and John A. W. Grant, Edinburgh, Scotland; 198, Prof. Dr. Ing. Lechner Jeno, Budapest, Hungary; 202, Lechner Lorand and Kautzky Tivadar, Budapest, Hungary; 204, Lippincott & Billson, Melbourne, Australia; 48, Kenneth MacDonald, Jr., and Maurice C. Couchot, San Francisco, Cal.; 12, Alfred Fellheimer and Stewart Wagner, New York, N. Y.; 135, Henry Hornbostel and Eric Fisher Wood, Pittsburgh, Pa.

RESIDENCE, MRS. BENJAMIN E. CHASE, SYRACUSE, N. Y.

Dwight James Baum, Architect.



RESIDENCE, MRS. FAYETTE BAUM, SYRACUSE, N. Y.

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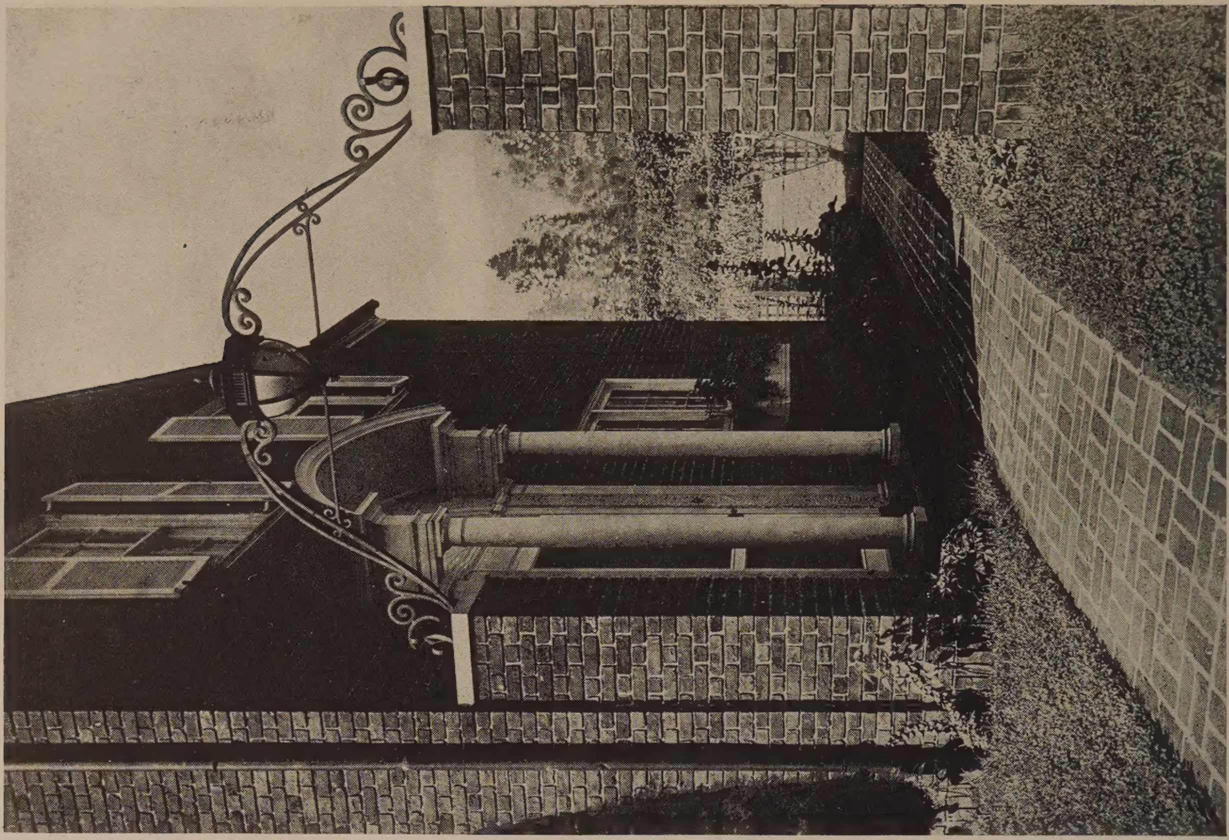
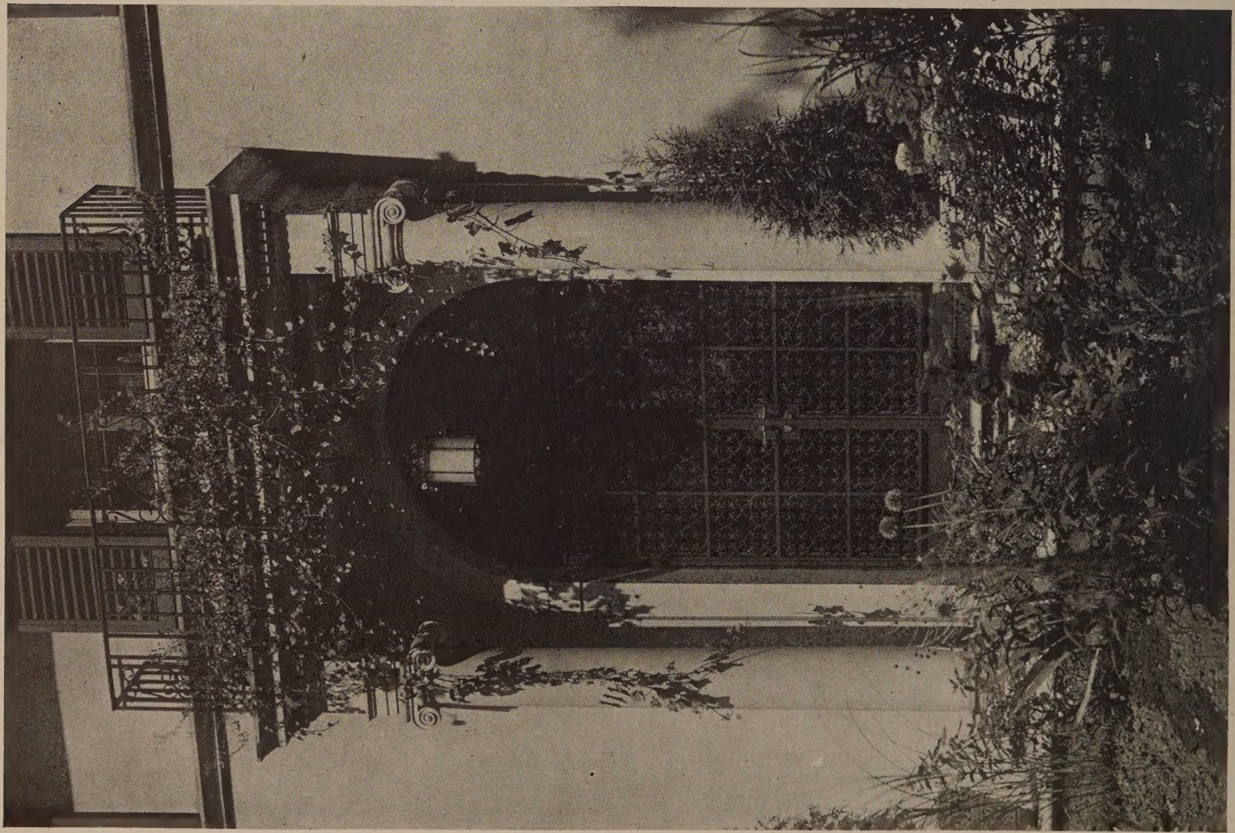
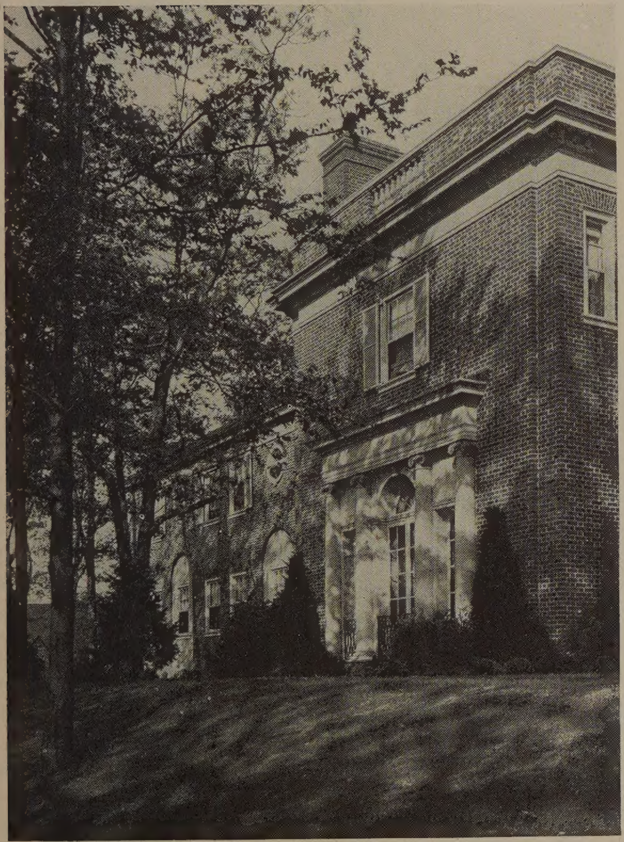


ENTRANCE DETAIL. Dwight James Baum, Architect.
RESIDENCE, MRS. FAYETTE BAUM, SYRACUSE, N. Y.

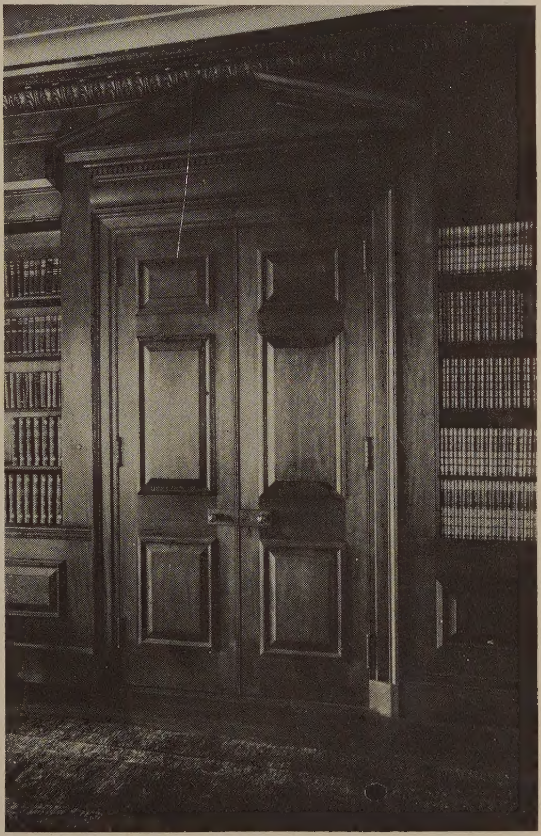


ENTRANCE DETAIL. Dwight James Baum, Architect.
RESIDENCE, MRS. BENJAMIN E. CHASE, SYRACUSE, N. Y.

GARAGE.



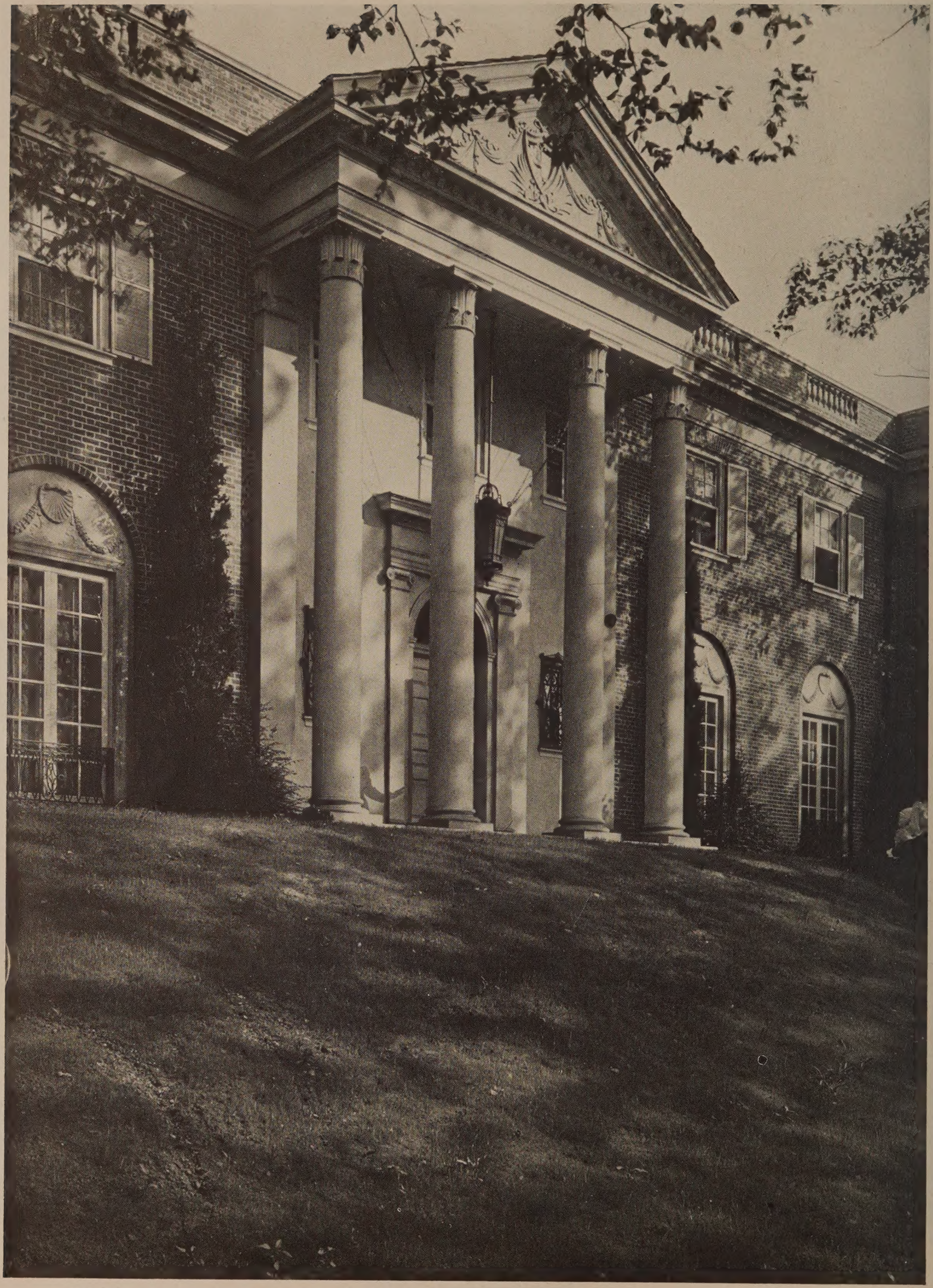
DETAIL OF HOUSE.



DETAIL OF INTERIOR.

RESIDENCE, WM. P. HOFFMAN, RIVERDALE-ON-HUDSON, N. Y.

Dwight James Baum, Architect.



DETAIL OF ENTRANCE (FRONT), RESIDENCE, WM. P. HOFFMAN, RIVERDALE-ON-HUDSON, N. Y.
Dwight James Baum, Architect.

Editorial and Other Comment

The Neglect of the Obvious

IN a recent number of *The New Republic*, Mr. Henry S. Churchill had some pertinent things to say on the subject of "Architecture: a Neglected Art." He very aptly pointed out the fact that the man in the street as well as the man who is presumably interested in the arts in general finds little in our magazines of culture given to the appreciation and criticism of architecture. The stage, any weird and primitive stuff from Russia, the making of cubist pictures, the newest fads in the so-called progressive arts of the day, the writing of books, receive their due amount of space and more than their due amount of dinner-table gossip, but the parent of all the arts, architecture, is rarely given any attention, beyond the mention of the cost of some great building, the number of its stories, or its probable value as an investment. Fact is, architecture has been commercialized (nothing escapes in these days), and its only place in the news of the day is as a commodity, something to be built and sold or rented. The advertising value of a great commercial structure is the paramount issue, and the man in the street is more interested in the fact that it cost $10,000,000, more or less, than in any consideration of design, fitness, or beauty. Beauty as it is manifested in architecture is supposed to be chiefly for the consideration of a limited number of highbrows, who may talk of certain structural details in terms found in histories of architecture or in lectures before women's clubs on the arts of the Phœnicians or the hypnotic charm of the lotus as applied to Egyptian temples.

That there is a history of architecture being written for us in every city and town in the country, a history that all might study with interest and profit, seems not to occur to either the public or with few notable exceptions to the public's interpreters, the writers on current matters of art.

Our architecture has never been so vital, so responsive to the spirit and the needs of our day, so capable, so distinguished, as it is right now. If we have not yet developed a distinctive national style, we are certainly on the way. In the use of the past in the present our architects have shown a fine sense of fitness, and without pretense of originality they have adapted old forms to new uses with great skill and good taste. And so far as we are concerned there is a sufficiency of national character in this manifestation of eclecticism. We are the heirs of all the ages and races, with the privilege to pick and choose and make over as we see fit.

"Architecture, it is true, merely is; but it is here, there, and everywhere, and by that fact has a greater influence on the cultural life of the nation than all the concerts and exhibitions combined. Nor is it as dead as some would have us believe. Out of the conditions imposed by constricted space, zoning laws, steel, concrete, glass, a febrile art, vital and nervous as is our civilization, is gathering form and independence. Slowly the old, encumbering dead forms are being pushed off by new necessitous growth, as the dead leaves of an oak are pushed off by the new."

Our Residential Architecture

IN giving the medal of honor to Dwight James Baum for his achievements in designing country houses, the Architectural League of New York has emphasized in a large way the fact that our residential architecture is of prime importance.

The league's exhibition this year is devoted chiefly to architecture and not to the showing of house-fittings and plumbing, and visitors have found there a refreshing and enlightening opportunity to study architecture and its allied arts with interest and profit. Not for several years have we come from a league show with the same degree of satisfaction. The big things are in evidence as usual, but there is more stress on residential work and on the kindred art of landscape architecture. Mr. Baum, the winner of the medal for country houses, has been for some time a recognized leader among the younger men in the designing of suburban and country houses, and his work has invariably shown refinement and good taste. With a full appreciation of the ever-present appeal of the Colonial, he has used the style with reserve and adapted it to his own ends with charming results. He is still a young man, the youngest to receive such a distinction, and as his work is not confined to the vicinity of New York, but may be seen in various parts of the country, his influence for better architecture will be felt in many directions. The medal of honor for country houses was awarded to Charles A. Platt in 1912, and to Delano & Aldrich in 1920.

Our residential architecture is the best in the world to-day, and readers of ARCHITECTURE have observed that it is not confined to any locality, but that good work is manifest all over the country. Far be it from us to forget or be blind to the awful stuff that may be seen and is honored with the name of architecture; we only wish to point out the fact that we have a number of men who by their example are helping to cultivate a desire for better designs throughout the country.

Good taste and a sense of fitness, well ordered and considered design, are as rare in architecture as they are in the other arts.

Competitions

WE have been asked by many readers to publish another group of the designs for the Chicago Tribune Building, and to say something about the cost of this and of competitions in general. The publication of twenty-five more of the Tribune designs in this number we believe will

be of interest to every one and a revelation of the generally high quality of the work submitted.

There is one aspect of such a competition not to be overlooked: the value of it to the profession at large. The wide publicity it has received has necessarily interested the man on the street and made him take at least a temporary interest in the study of architecture. As Mr. Alfred Grainger, the chairman of the Jury of Award, says:

"In the architectural profession this competition has, for six months, been of paramount interest, and its influence upon the American mind toward the profession of architecture will last for generations."

And we may all take pride in this further comment by Mr. Grainger:

"One gratifying result of this world competition has been to establish the superiority of American design. Only one foreign design stands out as possessing surpassing merit, and this truly wonderful design did not come from France, Italy, or England, the recognized centres of European culture, but from the little northern nation of Finland."

In response to our request, Mr. Githens, one of the competitors, has something to say in this number on the question of costs and the value of competitions.

The Exhibition of British Architecture

AN interesting feature of the New York Architectural League Exhibition this year was the showing of contemporary British architecture by means of photographs and drawings—the work of the members of the Royal Society of British Architects. In a place of honor with this exhibition appeared a large photograph of the fine portrait of Sir Christopher Wren by Kneller. The exhibition had a distinction derived chiefly from evidences of tradition and conservatism. No one could possibly miss the fact that the architecture shown was English, or fail to be impressed with the intimate charm of many of the designs for country homes.

Here, English architecture has always held a high place, and to it we owe much of the best of our own beginnings. It is in the English commercial and public buildings that we see manifested a quality of heaviness, of piling up of masses, of what seems to us a clumsy use of the orders, and a lack of nice adaptability in using the past in the present. We still may learn something from English domestic architecture, and no doubt our English friends may profit by a careful study of American monumental and commercial buildings.

Beauty and Utility

OUR new traffic towers, of which Mr. Joseph H. Freedlander is the architect, are an ornament to our main street, and add a note of the artistic to the scene. In the pauses of traffic that their variegated lights enforce let us hope that they may offer even a transient few moments for a study of them as of something beyond merely utilitarian regulators of an age of speed. They will bear attentive scrutiny from many points of view, from the interesting clock motive to the delicately carved granite bases, and add their element of distinction to the displays in the windows and the architecture that border the street of a thousand or more shops. We like the place and dignified figure they occupy in the long vista of Fifth Avenue, by day when the air is crystal, by night when they take their place in the long line of sparkling lights, that add a touch of beauty and mystery and alertness to a city that never sleeps.

Architectural League Medals Awarded

THE following medals were awarded at the Thirty-eighth Annual Exhibition of the Architectural League of New York:

Medal in architecture, to Dwight James Baum, of New York, for excellence in residential work.

Medal in decorative painting, to Edward Simmons, of New York City, for his decorative panel "One of the Muses," and his drawing "West Wind," for a mural at the St. Paul Capitol and a sketch for a mural, "The Pioneers."

Medal in sculpture, to Edward McCartan, of New York City, for his Eugene Field Memorial for Lincoln Park, Chicago, interpreting the theme of the "Babes in the Wood." (See frontispiece.)

Medal in landscape-architecture, to Harold Hill Blossom, of Boston, for his series of small house gardens.

Medal in craftsmanship, to the Herter Looms, for its tapestry "Romeo and Juliet."

The Avery prize, to James Novelli, for his bronze door.

The Profession of Landscape-Architecture

LANDSCAPE-ARCHITECTURE is primarily a fine art, which aims to create and preserve beauty in the efficient adaptation of land to human service, whether in the functional planning of cities or in the development or preservation of the natural scenery of the country. In its relation to the location of buildings and the treatment of their surroundings it requires a familiarity with certain parts of the technical field of architecture; but its materials are mainly included within the fields of geology, forestry, horticulture, and civil engineering, to which it is related in much the same manner that architecture is related to structural engineering and other similar technical subjects.

With the more and more wide-spread realization of our need for beauty as well as efficiency in land adapted to our use—beauty not merely as a luxury but as a practical necessity and as much a matter of course as practical efficiency—has come a steadily growing demand for men professionally trained in the production of this beauty wherever land areas are fitted to human service. This country offers a large opportunity for trained men as assistants in the offices of landscape-architects, as park superintendents, city foresters, etc., and as landscape-architects in private practice or public employ. During the period of our war emergency, the economic value of the landscape-architect's training in the large-scale adaptation of land for use was demonstrated more clearly than ever before—in residential developments for industrial workers and in the laying out of military and naval camps and cantonments; and our government has officially recognized the usefulness of the landscape-architect in such work. In the period of reconstruction now under way, the profession of landscape-architecture in its civic aspects has received an unprecedented impetus, with a corresponding demand for trained practitioners.

—*From the announcement of the School of Architecture, Harvard University.*

Zoning

ZONING ordinances have been adopted by 109 municipalities throughout the country, according to records obtained by the Division of Building and Housing of the Department of Commerce. This shows the rapid progress of zoning since January 1, 1922, when only 55 municipalities had such ordinances in effect.

ENTRANCE–COURT, RESIDENCE, MRS. HENRY STEPHENS, GROSSE POINT FARMS, MICH. Charles A. Platt, Architect.

FAÇADE, RESIDENCE, MRS. HENRY STEPHENS, GROSSE POINT FARMS, MICH.

Charles A. Platt, Architect.

GARDEN SIDE, RESIDENCE, MRS. HENRY STEPHENS, GROSSE POINT FARMS, MICH.

Charles A. Platt, Architect.

STAIRCASE.

DINING–ROOM MANTEL. Charles A. Platt, Architect.

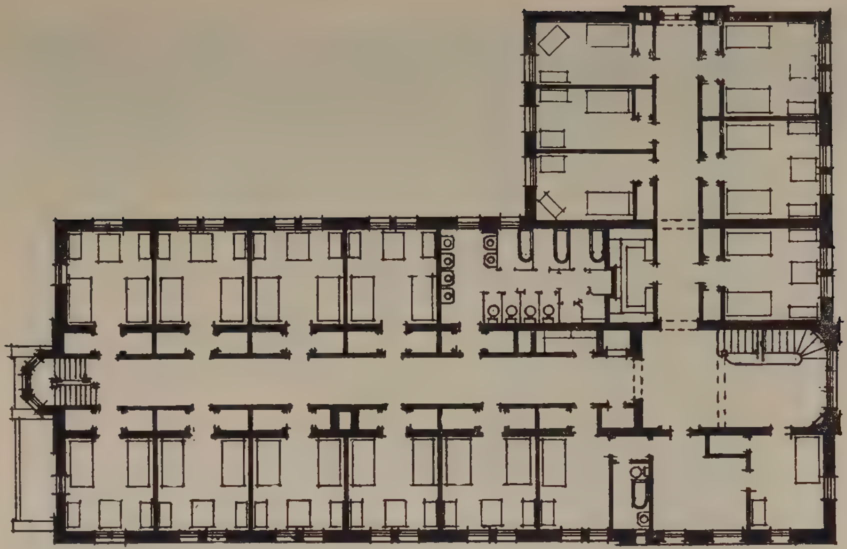
RESIDENCE, MRS. HENRY STEPHENS, GROSSE POINT FARMS, MICH.

LIBRARY, RESIDENCE, MRS. HENRY STEPHENS, GROSSE POINT FARMS, MICH.

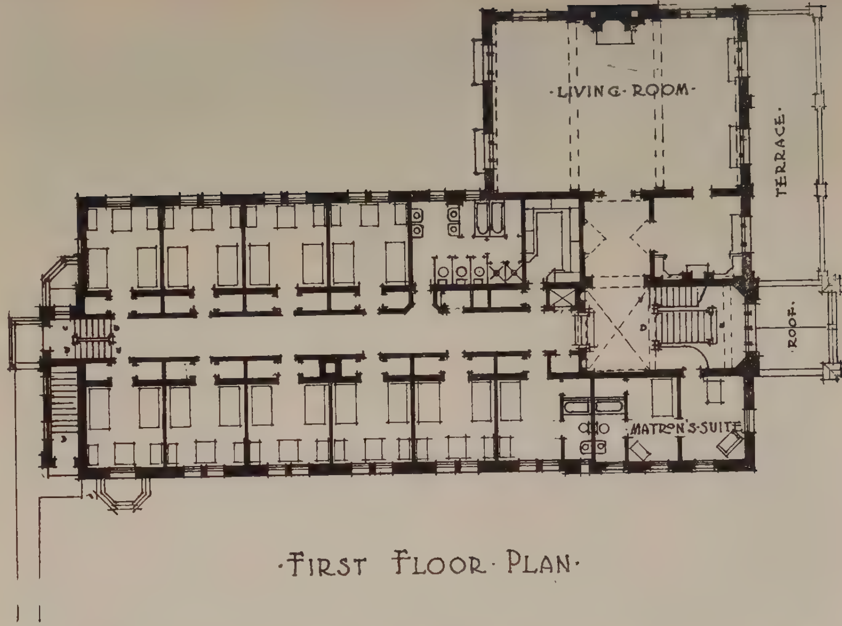
Charles A. Platt, Architect.

DORMITORY, STATE NORMAL-TRAINING SCHOOL, WILLIMANTIC, CONN.

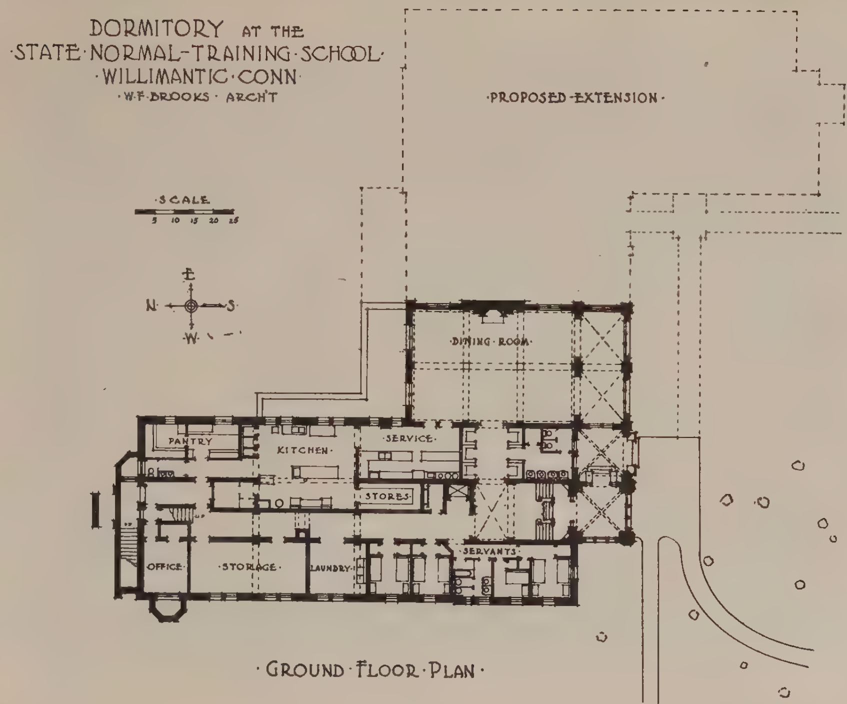
W. F. Brooks, Architect.



TYPICAL FLOOR·PLAN·



·FIRST FLOOR·PLAN·



·GROUND·FLOOR·PLAN·

DORMITORY, STATE NORMAL-TRAINING SCHOOL, WILLIMANTIC, CONN.

ENTRANCE DETAIL.

W. F. Brooks, Architect.


SITTING–ROOM.


LIVING–ROOM.


DINING ALCOVE.


DINING–ROOM.

W. F. Brooks, Architect.

DORMITORY, STATE NORMAL–TRAINING SCHOOL, WILLIMANTIC, CONN.

RESIDENCE, CLIFTON G. ELLIS, HAVERHILL, MASS.

J. Williams Beal, Sons, Architects.

DETAILS OF EXTERIOR, RESIDENCE, CLIFTON G. ELLIS, HAVERHILL, MASS.

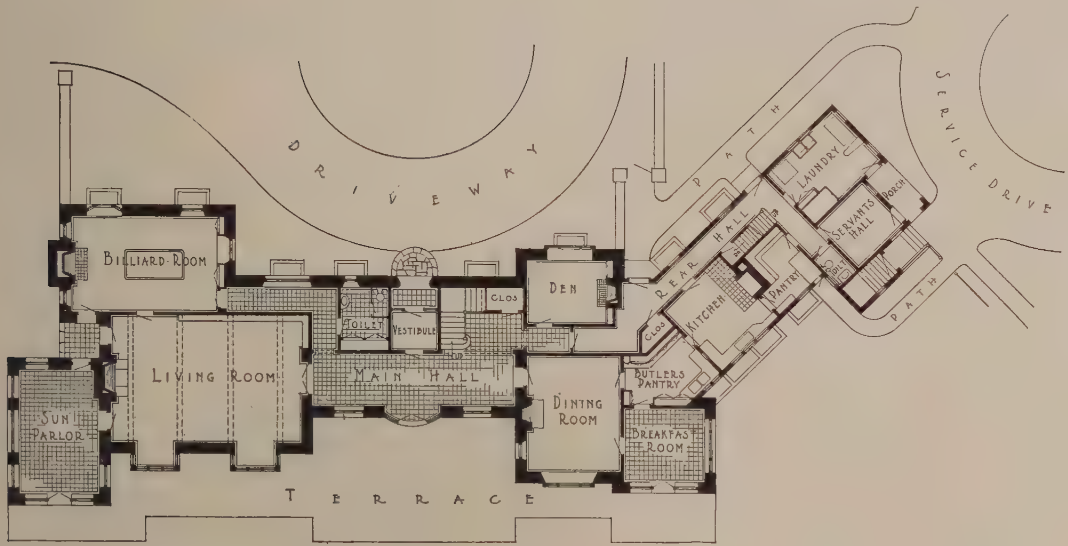
J. Williams Beal, Sons, Architects.

BREAKFAST-ROOM.

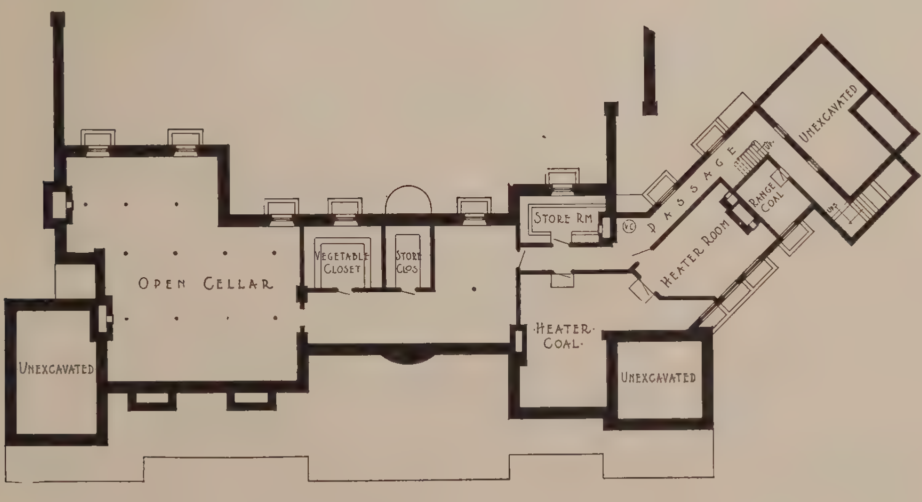
DINING-ROOM MANTEL. J. Williams Beal, Sons, Architects.

RESIDENCE, CLIFTON G. ELLIS, HAVERHILL, MASS.

SECOND FLOOR PLAN·



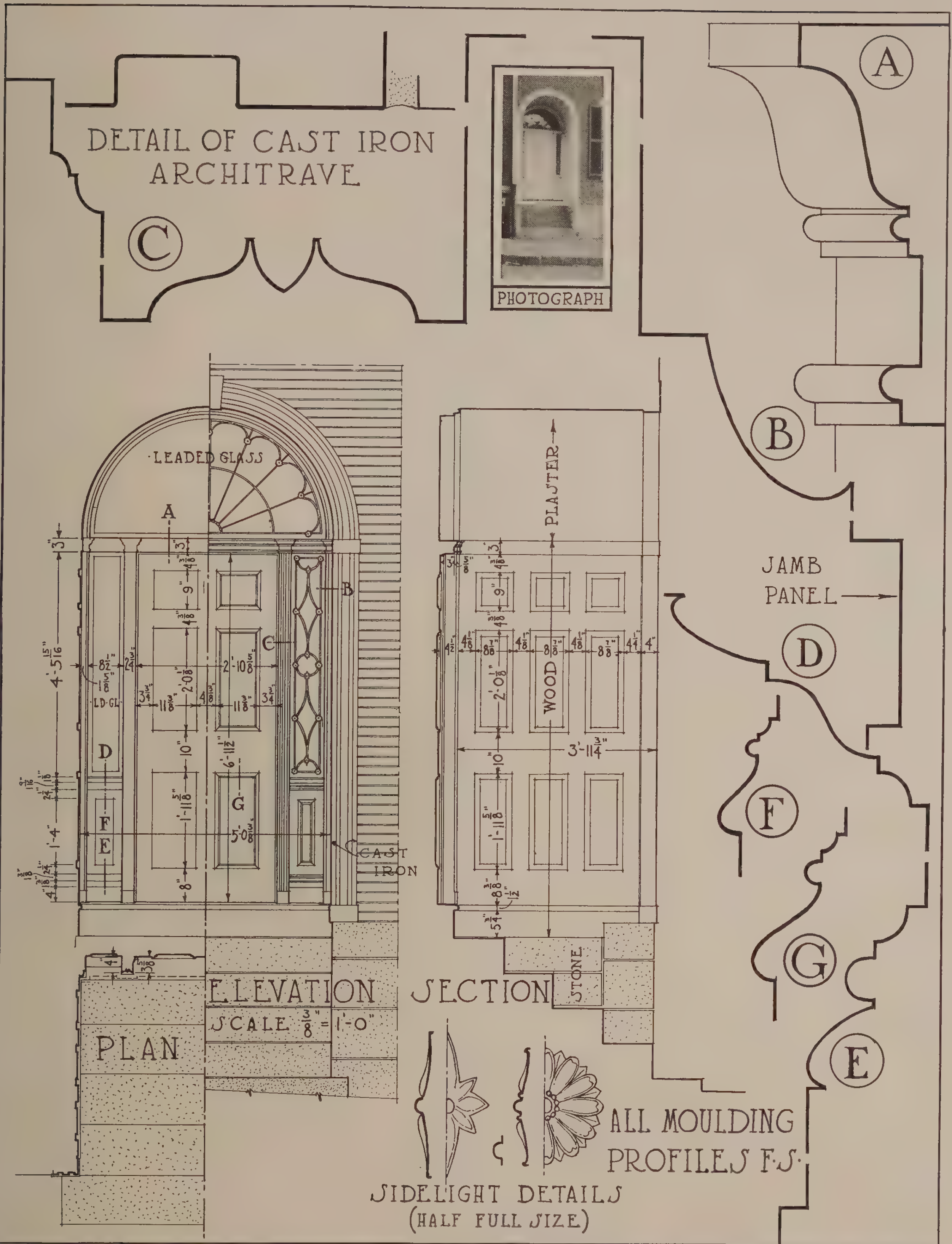
·FIRST FLOOR PLAN·



·BASEMENT PLAN

PLANS, RESIDENCE, CLIFTON G. ELLIS, HAVERHILL, MASS.

J. Williams Beal, Sons, Architects.



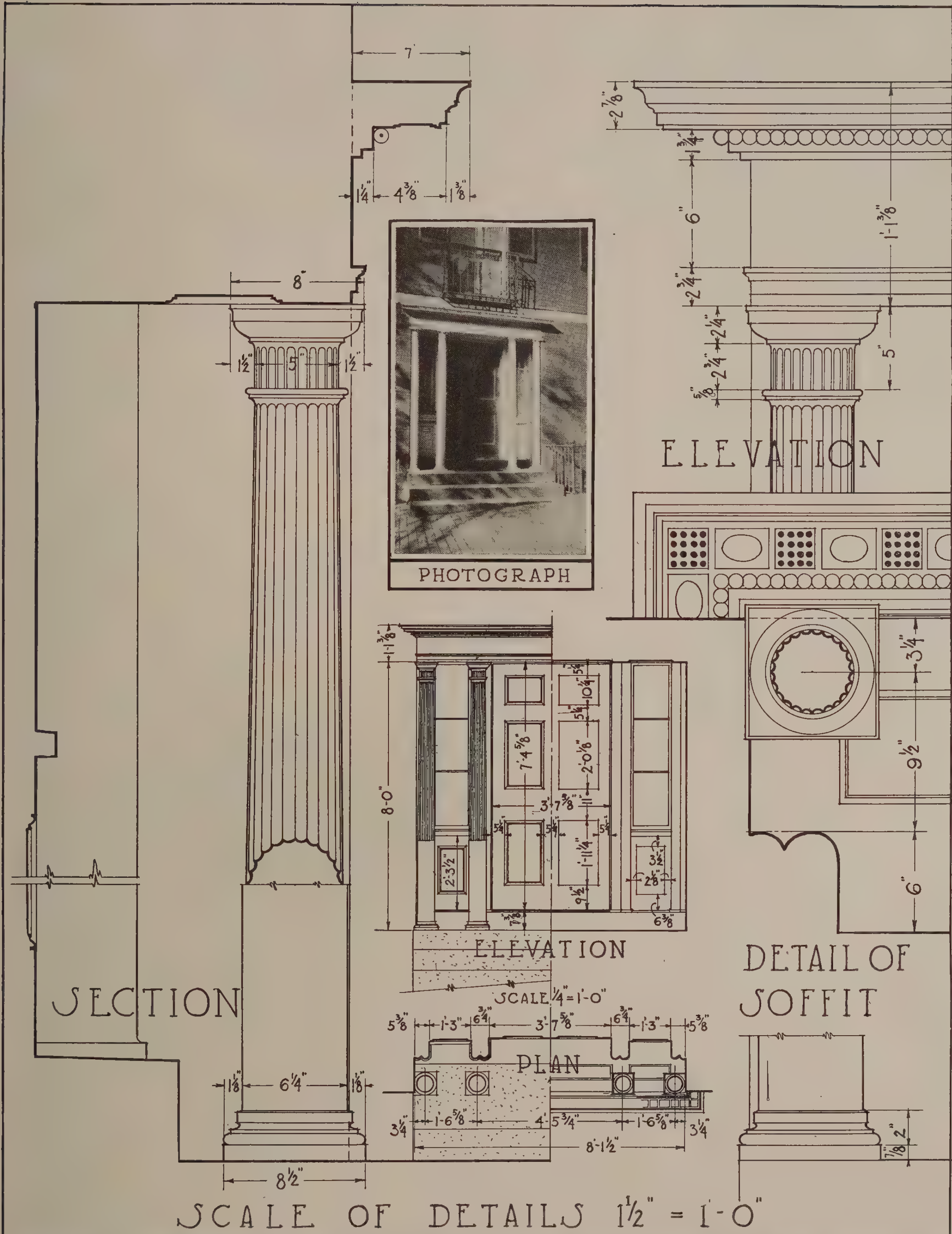
BOSTON COLONIAL SERIES

·DOORWAY AT Nº 60 CHESTNUT ST·

·BOSTON MASS·

·TYPICAL EXAMPLE OF THE ARCHED DOORWAYS OF BEACON HILL·

MEASURED AND DRAWN BY G·R·MITCHELL



BOSTON COLONIAL SERIES

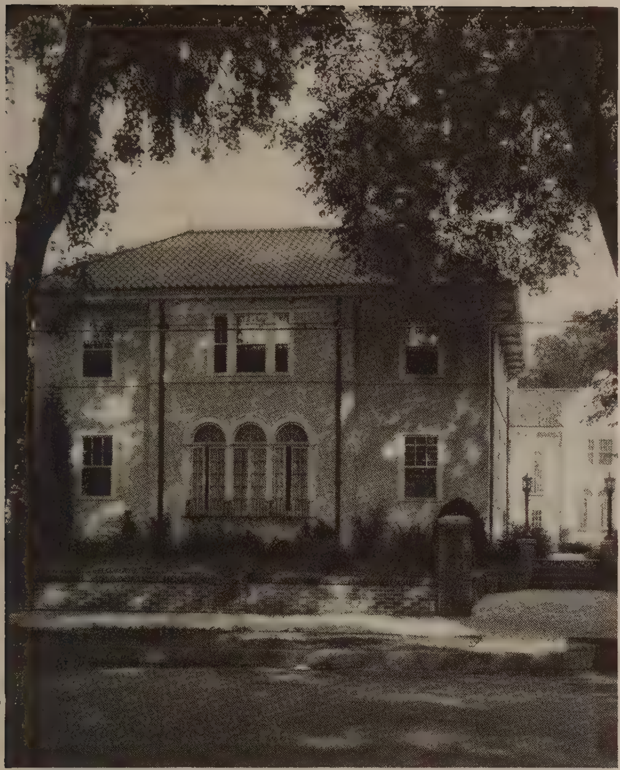
·DOORWAY AT Nº 13 CHESTNUT ST·

·BOSTON MASS·

CHARLES BULFINCH ARCHITECT

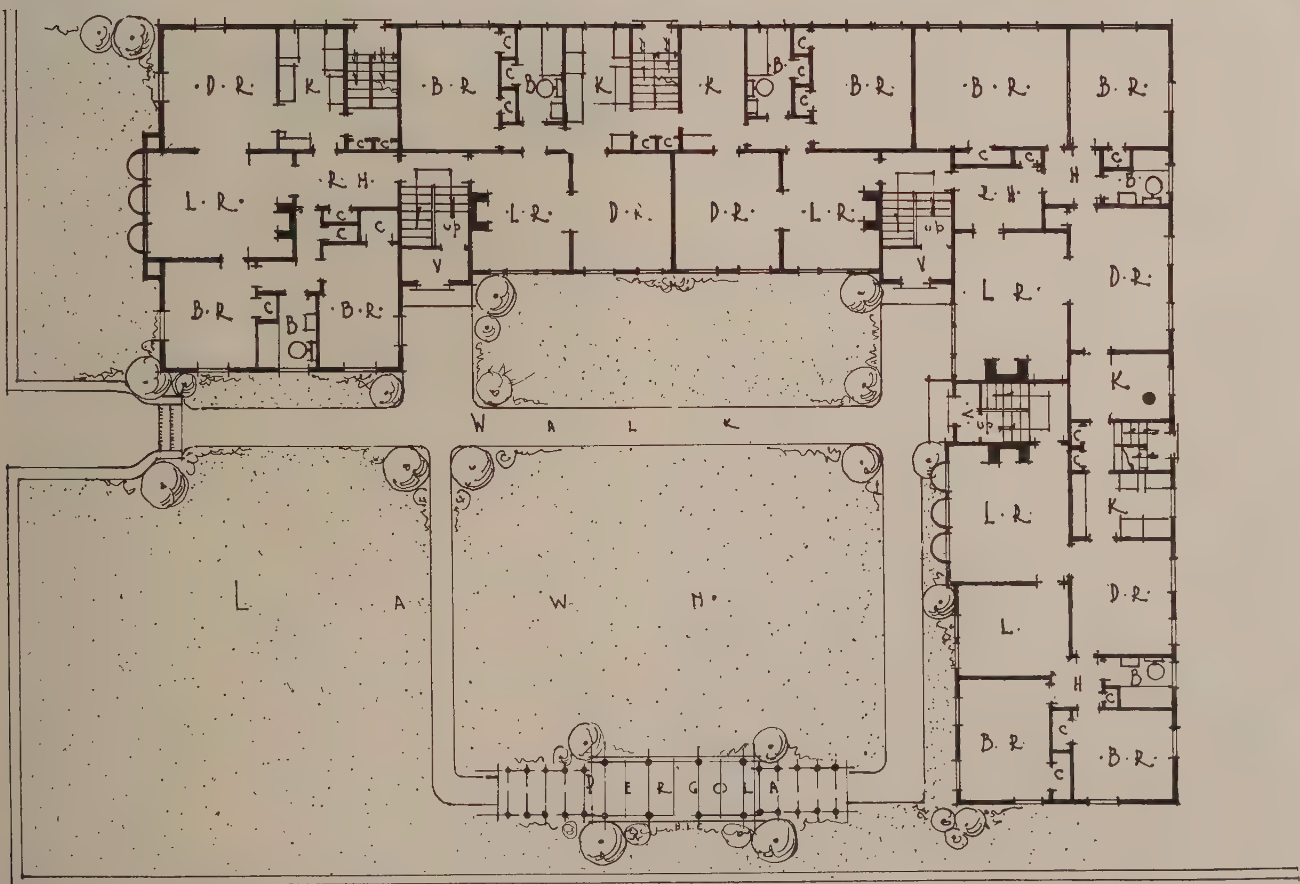
MEASURED AND DRAWN BY G R MITCHELL

APARTMENT-HOUSE, NEW HAVEN, CONN. J. Weinstein, Architect.



DETAIL OF WING.

DETAIL OF ENTRANCE.



TYPICAL FLOOR PLAN.

APARTMENT-HOUSE, NEW HAVEN, CONN.

J. Weinstein, Architect.

Construction of the Apartment-House

By H. Vandervoort Walsh

Instructor, School of Architecture, Columbia University

ARTICLE III

Walls and Foundations of Non-Fireproof Apartments

Materials

THE non-fireproof apartment of wooden interior and masonry exterior must have its outside walls constructed of brick, rubble-stone, concrete, or hollow tile, for city administrators have found that these barriers are necessary to retard the spread of fire from one building to another. But of these four materials, brick seems to be the favorite,

Rubble-stone foundation walls. Note finish of the top and rough plastering of side.

and the most used. Indeed, as a recognition of this fact, all building codes specify the required thicknesses of walls in units corresponding to those determined by the sizes of bricks as laid in the wall. Of course, in the suburbs of large cities, and in certain smaller towns, there exist examples of apartments constructed with walls of concrete, rubble-stone, or hollow tile, and now and then in the larger cities such structures may also be found. Generally speaking, however, concrete walls for this type of structure are not economical, when they have to be carried above the third floor, because of the difficulty and the cost of handling the wooden forms into which the concrete is poured. As for hollow building blocks, either terra-cotta or concrete, most building codes actually prevent their use in buildings over 40 feet high, or three stories. And this height is also the greatest to which rubble-stone walls can be carried with safety. Thus, for the largest types of non-fireproof apartments, as built in the most populated sections of the city, one finds walls of common brick, whereas in the more open sections one finds the small two and three family apartment with walls of hollow tile, concrete, rubble-stone, or brick.

On the other hand, one will notice that there is a tendency to use rubble-stone or concrete for foundation walls in preference to brick. In cities like New York, where from the excavations can be taken stone to build the foundations, it is not at all surprising to find that most apartments have foundation walls of rubble-stone. But in cities that have no such access to stone, the concrete foundation wall is found the most. There is a certain adaptability to position that makes concrete very suitable for all foundation work. Indeed, this material has become almost universally used for building the footings under piers and foundation walls, whether the upper structure is of stone or brick. The problems of constructing forms in these lower portions of the building are simple, and the concrete flows over the foundation bed, filling in all uneven places and forming a firm and solid base for the superstructure.

Now the quality of the materials of which these walls are built is up to the standards required by the building code or local tradition. If one considers the average work that is built in a city of the first class, there is not much difference between the quality of materials used in this class of wall construction and that in the work of other buildings.

Common bricks that are employed are sound and well burned, and if they are second-hand, they are thoroughly cleaned before going into the wall. In the same way as in any other construction, there is the temptation to use up all of the broken bricks, but most building codes prohibit the use of more than 15 per cent of these broken bricks or bats in the walls, and so this evil is checked here with about the same force as in other types of buildings. As fine labor in laying the brick wall may not be employed on this class of work as on the more expensive public and commercial structures, but then this is not necessary. Bricks may not be culled for size by their color and the latest efficiency methods adopted for setting the bricks, for the contractor that builds structures of this kind may have only a small organization. Sometimes a few parts of the wall may be laid with dry brick, thus spoiling the set of the bonding mortar, but taken all in all, the masonry work is quite good enough for the purpose for which it is used.

Most building codes definitely regulate the kind of

Rubble-stone walls in progress of construction.

mortar that is employed in the building of these brick walls. Walls for foundations are required to be laid in cement mortar in order to resist the dampness that disintegrates them. Also parapets or the tops of chimneys that are subject to the severest weather conditions are laid in cement mortar and not lime mortar. Other walls are generally laid in lime mortar, or lime-cement mortar, for the very simple reason that they are cheaper and serve the purpose. Walls faced with ashlar are best laid with cement mortar, using a non-staining cement for the facing, and sometimes the building code will so require. Many contractors realize that this precaution is worth the additional expense, and follow it even though the building code may not require it.

No unusual effort is made to secure the best sand, as might be required for reinforced-concrete construction. Local pit sand that is cheap and capable of being cleaned is employed. This sand ought to pass through a quarter-inch screen and have smaller particles in it, but not fine dust. Coarse sand with some smaller particles in it is the best. Some well-known make of Portland-cement mortar is generally employed, there being no particular reason for using a cement that does not come up to the standards of the American Society for Testing Materials. Perhaps a little cement that has spoiled somewhat in poor storage may be slipped in now and then, yet the building may never suffer from neglects of this kind. One must realize that a great many builders of apartments do not follow specifications prepared by the technical staff of some first-grade architect's office. These builders may be merely graduate masons who are counting the dollars, and know from experience that a point stretched here and there from the best practice may not create any great calamity, but save them considerable money. There are, unfortunately, some individuals who carry this too far.

The proportioning of materials for masonry work of this kind is the same as for any other. For cement mortar the ratio of cement to sand, by volume, is usually made as 1 to 3, and for lime-cement mortar, 1 part of cement, 1 part of lime, and 3 parts of sand. Although lime mortar ought to have a porportion of about 1 part lime to 4 parts sand, yet this is not strictly adhered to, since the working qualities of the mortar are the essential thing which the mason will demand, and any mixture that satisfies him is good enough for the wall of the building.

The customary proportion for concrete is 1 part of cement to $2\frac{1}{2}$ of sand and 5 parts of broken stone or gravel. Although there is not always a very careful selection made of the aggregate, yet experience shows that the best work is secured when this aggregate is graded with enough fine particles to fill in the voids between the larger 2-inch-diameter pieces. This will produce a denser and stronger concrete, as will also a more careful regulation of the quantity of water in the mixture. A medium wet mix is to be desired.

Thickness

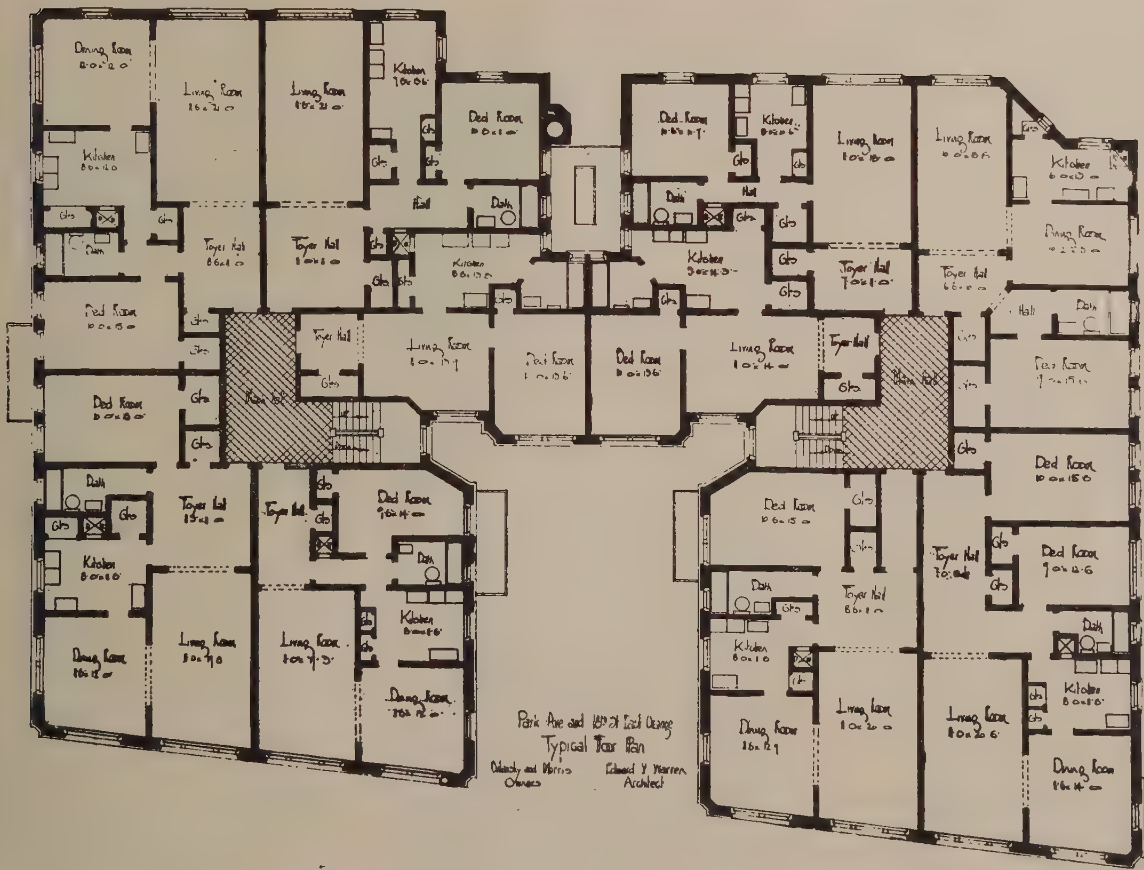
If it is assumed that the minimum height of the ceiling from the floor to the underside of the plastered beams is not less than 9 feet, which it ought not to be, and the average thickness of the floor construction is about 16 inches, then, since the highest non-fireproof apartment is limited to six stories, and not more than one and one-half times the width of the street, the total height in feet will be about 65 feet, a little over or a little under, according to the construction of the floors and adopted height of ceilings. By the limitations of the height, and the character of the floor construction and the kind of loads which will come on the floors, the thickness of the walls is determined. Buildings of this kind have very small loads to carry on the floors, never more than 40 pounds per square foot at the most, and the weight of the floor construction is comparatively light; say for 3 inches by 10 inches yellow-pine beams, spaced 16 inches on centres, covered with two floors on top and plaster ceiling below, the weight will be found not to exceed more than 22 pounds per square foot. If an average span is taken of 18 feet, and the beams are assumed to have a bearing in the wall of about 4 inches, they will bring a load under their ends on the brick wall of only 60 pounds per square inch, which is very small, as practical stability will allow. The upper part of a bearing wall to support so light a load is made as thick as the length of one brick and a mortar joint of $\frac{1}{2}$ inch and the width of a brick, or about $12\frac{1}{2}$ inches. If the wall is not built to support the floor construction, or is an interior bearing or non-bearing wall, it may be only the length of one brick in thickness, or 8 inches. Of course there is a limitation as to the height to which such thin walls can be carried, and this is 55 feet. Now as many apartments are about 65 feet high, this means that the wall of the first floor is made wider by another brick width and mortar joint, or 17 inches thick, up to the top of the second-floor beams. From this point up the wall can be $12\frac{1}{2}$ inches thick. Of course, in like manner, the non-bearing exterior walls, interior bearing and non-bearing walls are increased on the first floor to $12\frac{1}{2}$ inches thickness. If by chance rubble-stone walls are built, these should be made 4 inches thicker than any of the corresponding brick walls above mentioned, and, moreover, such walls ought not to be carried higher than 60 feet.

Now in all cities the foundation walls are made thicker by the width of one brick, or 4 inches, than the wall above them which they support. This additional thickness is usually built, as most increases of thickness, on the inside face of the wall, since the outside face is usually on the lot line, and will permit of no additional projections at the base. If the foundation walls are built of rubble-stone, instead of brick or concrete, the thickness of them is increased 8 inches more than that of the wall above them. This same unbalanced increase of thickness is carried out with the footings, too, which are under the side walls on the lot line. These, instead of projecting evenly on both sides of the wall, step off on the inside only. Thus a cross-section through the typical side wall of an apartment would show the outside straight and vertical, while the inside would begin with a step at the footing, and then another step at the top of the first-floor beams, then another at the top of the second-floor beams, and then a vertical line from here up to the top. The natural tendency for such a wall to topple outward is quite evident, especially if a fire expands the interior face, and the necessity for good anchorage of beams at each floor level is obvious. Just as a soldier at attention is easier to push over backward than forward, so is this wall easier to push outward than inward.

Need for Increase over Minimum Thickness

To maintain the same thickness of wall under all conditions, as above stated, would, on the face of it, seem ridiculous to one's common sense, and so it is that additional width must be given when the facing of the wall is not thoroughly bonded with it, or when it is cut up too much with windows, flues, chases, and the like, or when its length, unbraced by walls at right angles to it, is very great, or when the clear span between bearing walls is extra large, increasing the bearing of the ends of the floor-beams. If

(Continued on page 92)



APARTMENT-HOUSE, PARK AVENUE AND 18TH STREET, EAST ORANGE, N. J. Edw. V. Warren, Architect.

(*Continued from page* 90)

any one of these conditions exists, or even more than one, it seems reasonable that the wall ought to be increased by the width of a brick, 4 inches. That is, if the wall normally would be constructed $12\frac{1}{2}$ inches thick, if there were too many holes in it, its width should be increased to 17 inches, to be on the safe side. But, having increased the thickness

Rubble-stone walls above grade. Note plastering of window.

to meet one of these weakening conditions, it would not be necessary to increase it again $4\frac{1}{2}$ inches if two of them existed. One increase would be enough unless conditions were unusually bad.

Considering these matters now in detail, it is quite simple to appreciate that if the facing of the wall is not properly bonded to the backing, no great additional strength would be secured from it, and this facing ought not to be counted in with the actual working thickness of the wall. For example, suppose the wall was to be 12 inches thick, and it was to be faced with 4 inches of limestone ashlar, bonded to the backing with metal clips. This facing could not be considered as making up the required thickness of 12 inches, but it should be considered by itself as merely a covering over the actual wall that is carrying the loads of the building. However, if this ashlar facing were bonded into the backing every other course with stones about 8 inches thick, then it would be reasonable to assume that it was an integral part of the 12-inch thickness of the wall.

If, on the other hand, we cut too many holes in the wall with window openings and flues, there must be some limit to reducing the horizontal cross-section of the wall that is left after the holes have done their damage. This limit we would expect to vary with the bonding quality of the mortar. And so we have the custom of increasing the thickness of the wall $4\frac{1}{2}$ inches over the usual thickness, if, when we use cement mortar, the holes in horizontal cross-section show an area of 45 per cent of what would be the area of the wall at that point if no holes were in it. We likewise increase the thickness of the wall, when lime mortar is used, if the area of the holes is 30 per cent. Of course this increase in the thickness of the wall need not be made if adequate piers and buttresses are employed.

In addition to limiting the thickness in this respect, there are restrictions upon the arrangement and building of chases in walls. For example, no chase ought to be cut out of the masonry wall deeper than one-third its thickness. No chase ought to be constructed within the area required for a pier to carry its apportioned load. The horizontal run of any chase ought not to exceed 4 feet.

Likewise, there are limitations upon recesses cut in walls by the vertical shafts of stairways. As the walls increase in thickness toward the bottom, any vertical shaft with straight sides will cut recesses out of the wall on the lower floors. In such cases it is customary to use the thickness of the wall on the fourth floor as a minimum, and carry this thickness downward to the basement, cutting out from the lower wall the necessary masonry. In this way the thickness of the wall for the stairwells on the outside wall will be $12\frac{1}{2}$ inches for ordinary apartments. But no two recesses like this should be located nearer than 6 feet.

Recesses are also often built into walls for alcoves or other similar purposes. There should not be less than 8 inches of brickwork at the back of them, and their total width should not be in excess of 8 feet, and their height not greater than a foot and a half from the underside of the floor-beams. In order to prevent them from weakening the wall, the top of such recesses should be arched over with brick arches or spanned with steel lintels.

Book Reviews

FREDERICK LAW OLMSTED, LANDSCAPE ARCHITECT, 1822–1903. Edited by FREDERICK LAW OLMSTED, JR., and THEODORA KIMBALL. Early Experiences, together with Biographical Notes. Illustrated. G. P. Putnam's Sons, New York and London.

This small volume, almost entirely given to biographical and other personal matters, is intended as an introduction to a series covering Mr. Olmsted's main activities as a landscape architect. The second volume will deal with his first professional undertaking in New York, Central Park. In the Biographical Notes are many records of Mr. Olmsted's early activities, including important work on public and private grounds in various parts of the country. It was in 1882 that he published "Spoils of the Parks—With a Few Leaves from the Deep-Laden Note-Book of a Wholly Unpractical Man," a reminiscent account of political interferences in the management of Central Park. Evidently times have not changed.

No one will open this volume and look on the fine young face that appears as the frontispiece without feeling that here is an acquaintance worth having; and what an attractive group of young idealists appears in the picture of the five friends in New Haven days.

In the autobiographical notes are many delightful personal revelations of character and comments on contemporary manners and social interests. He writes of his Farm Experiences, of Studying and Reading, European Travel, Southern Trips—all in a delightfully personal and unaffected manner, and includes many interesting reflections upon his experiences and the landscape features which he was always studying. It reveals a man with an innate love of nature and shows how a natural taste for landscape developed into the knowledge that made him the first of our great landscape architects. Many will remember that the beautiful landscape features of the Chicago World's Fair were due to his genius.

In 1857 Frederick Law Olmsted was appointed superintendent of Central Park, in New York, and at that time the profession of landscape architect was practically unknown. It was at the end of 1857 that Andrew Jackson Downing's associate, Calvert Vaux, invited Mr. Olmsted to participate with him in the competition for the design, thus beginning a partnership which brought about public recognition of a new professional field and brought fame to both Mr. Olmsted and Mr. Vaux.

Mr. Olmsted's boyhood was obviously a happy one.

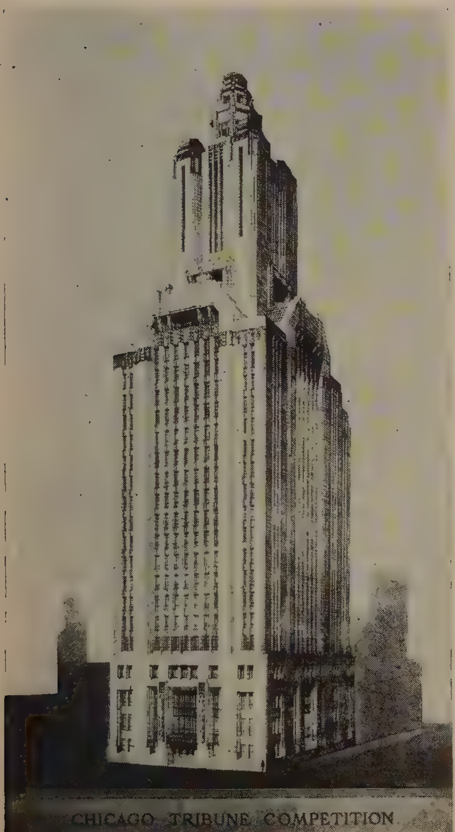
"The happiest recollections of my early life are the walks and rides I had with my father and the drives with my father and stepmother in the woods and fields. Sometimes these were quite extended and really tours in search of the picturesque. Thus before I was twelve years old I had been driven over the most charming roads of the Connecticut Valley and its confluents, through the White Hills and along most of the New England coast from the Kennebeck to the Naugatuck. We were our own servants, my father seldom fully trusting strangers in these journeys with the feeding, cleaning, or harnessing of his horses. We rested long in pleasant places; and when at noon we took the nags out and fed them by the roadside, my father, brother, and I would often wander far looking for a bathing-place and an addition of fresh wild berries for the picnic dinner which my mother would have set out in some well-selected shady place.

(*Continued on page* 110)

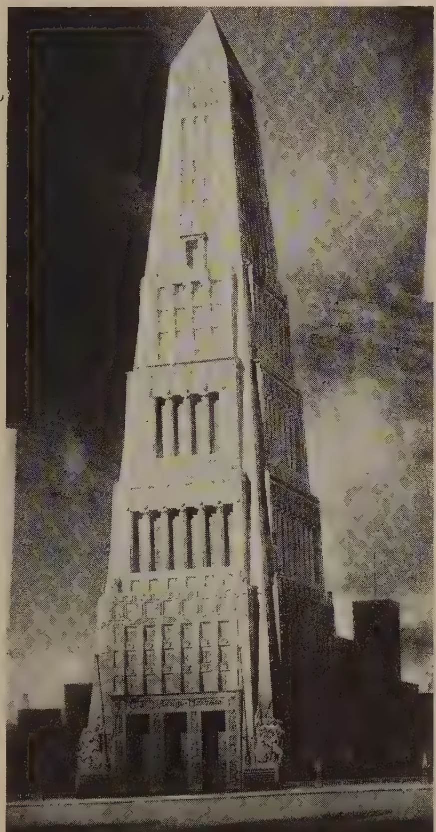
Thomas J. George, Honorable Mention.

Albert J. Rousseau, Honorable Mention.

Shaw & Hepburn, Gordon Allen, associate architects.



George F. Schreiber, Honorable Mention.



Alfred Fellheimer, Stewart Wagner, Honorable Mention.

B. H. & C. N. Whinston, Honorable Mention.

CHICAGO TRIBUNE BUILDING COMPETITION.

Frank Fort, Honorable Mention.

A. N. Rebori, Honorable Mention.

John Wynkoop.

Alfred Morton Githens, Honorable Mention.

Lucian E. Smith, Honorable Mention.

Walter Dabney Blair.

CHICAGO TRIBUNE BUILDING COMPETITION.

N. S. Spencer & Son.

Kenneth McDonald, Jr., and Maurice C. Couchot, Honorable Mention.

Edmund S. Campbell, Honorable Mention.

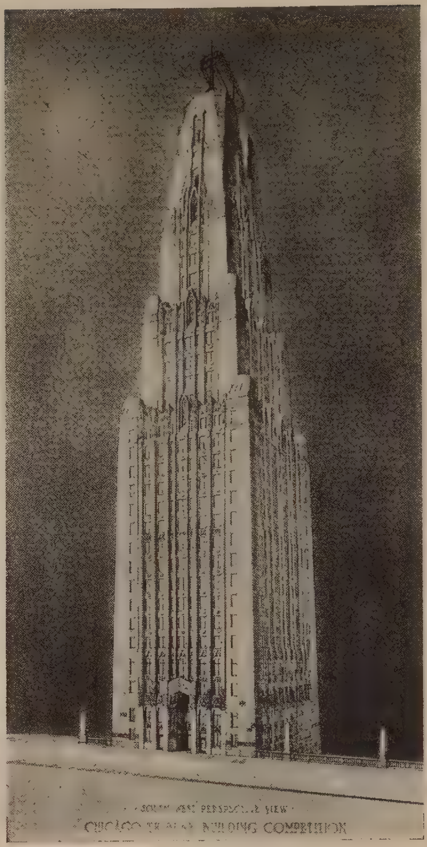
Claude Bragdon, Honorable Mention.

Benjamin Wistar Morris, Honorable Mention.

Hewitt & Brown, Honorable Mention.

CHICAGO TRIBUNE BUILDING COMPETITION.

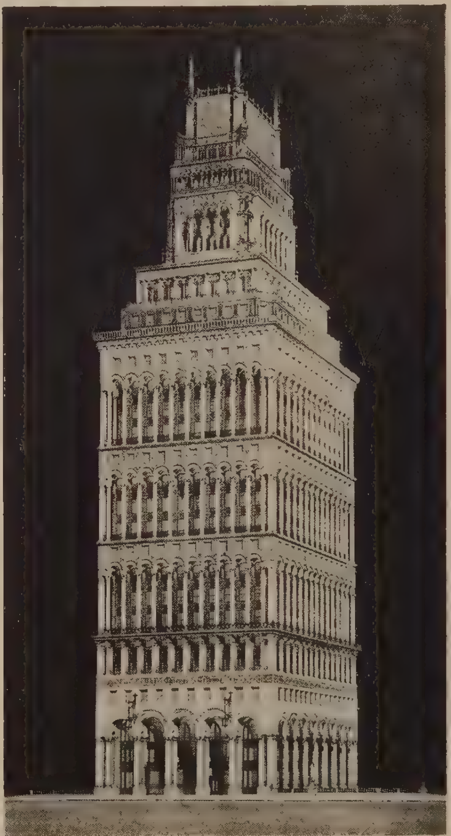
Louis Lott.



Arthur Frederick Adams, Honorable Mention.

Weeks & Day.

D. H. Burnham & Co., Honorable Mention.



Henry Hornbostel and Eric Fisher Wood, Honorable Mention.

Butler & Corse, Honorable Mention.

CHICAGO TRIBUNE BUILDING COMPETITION.

The Art of Painted Windows

By W. Francklyn Paris

PART II

THE art of composing a carton for execution in glass, like the art of making cartons for mosaic or for tapestry, calls for a highly developed sense of decoration, and the periods of decadence in vitrals, as in tapestry and mosaic, are those in which artists have tried to approximate in glass or wool or tessera effects produced on canvas with brush and pigment.

Strasbourg Cathedral. Thirteenth and fourteenth centuries.

A tapestry that looks like a painting is not a good tapestry any more than is a mosaic that tries not to look like a mosaic a good mosaic, or a vitral that resembles a pastel a good vitral. In all three the outline is essential. The contrasts must be sharp, the drawing firmly accented, the composition simple.

The artist who chooses painted glass as his medium must think quite as much of the leads as he does of the glass. These grooved veins that run through the design do not serve the purpose of merely soldering together separate fragments of colored glass. They fill the much more important office of giving sharpness to the contour of each fragment, and if the fragment is inconsequential and does not need this emphasis the artist is at fault for supplying it.

The technic of the art has not changed materially in five centuries. In fact, science has simplified many of the processes and increased the number of shades available. The leads, or cames, are now grooved by machinery, and the glass which once had to be cut with a red-hot iron is now much easier pieced out with a diamond. While the art of painted glass did suffer an almost total eclipse during the eighteenth century and part of the nineteenth, none of its secrets were permanently lost.

As in the twelfth century, the materials used in glass-making are silicates, alkalies, and earths. A fine white sand with an admixture of potash and sodas is brought to a melting point and metallic oxides provide the coloring element. Red is produced by copper or gold, yellow by silver, iron, or antimony, blue by cobalt, green by copper, etc.

There is a legend to the effect that the process by which yellow glass is obtained was discovered accidentally in the fifteenth century by a Dominican monk, Jacques l'Allemand, of Bologna, who dropped a silver button from one of the sleeves of his cassock into the hot metal which he had just drawn from the kiln. The story is at least plausible.

The varieties of glass used in present-day vitrals are known as antique, which comes in various kinds, such as pot metal, flushed, streaky, English Norman slab, and Prior's Early English. Very little of Norman slab or Prior's glass is used. What is designated as pot metal is glass colored in the pot when in a molten state. In this glass the color pervades the whole of a sheet equally. The only difference in shade arises from a difference in thickness. The thick part of pot metal will have a deeper color than the part that is thinner.

Strasbourg Cathedral. Thirteenth and fourteenth centuries.

Flash glass is white glass coated with a film of colored glass. Its origin is due to the necessity of securing a ruby glass that would be intense in color and yet retain its transparency. In order to do this, the glass-blower has to dip his rod first into melted white glass and then into ruby. When this is blown a thick sheet of white glass is covered by a very thin superficial layer of ruby glass. Flash glass comes in ruby, blue, green, yellow, and purple. There is also a flash pink made from gold which is very beautiful.

Streaky glass is made by dipping the blow-pipe successively into pots of differently colored metal and working the small quantities thus collected into one mass. When this is blown the various colors are spread out in streaks, each distinct in hue.

Norman slab is produced by blowing a bubble of glass into a box-shaped mould. This mass is then split into slabs of various sizes with great thickness in the middle and relative thinness on the edges. Where a deep shade of color is desired they are of great use.

The present-day leads are cast in an iron mould into strips about eighteen inches long. These strips are then passed through a mill or vise having regulated wheels and cheeks of hardened steel. Each casting is squeezed through the mill under great pressure until it finally emerges in the

form of a came, or strip, about five feet long and groved on two sides. By regulating the aperture of the vise, cames of various widths can be produced, from an eighth of an inch to an inch and a half.

Another important element in the construction of vitrals is iron. Small sections of painted glass soldered together with a flexible lead would be unable to withstand any considerable pressure of wind without the support of ironwork. In ancient cathedrals and edifices with large window openings this ironwork was disposed in a geometrical arrangement following as much as possible the design in the painted window. In mullions and narrow windows this treatment is not necessary and the ironwork as a rule takes the form of simple horizontal bars with the occasional addition of an upright stanchion.

The making of the modern window is the work of many hands. Having obtained an accurate scale of the opening to be filled, the artist proceeds to make a colored sketch reduced in proportion to a scale of about one inch to the foot. After this has been produced he must make a full-size detail drawing in charcoal with all the leads indicated clearly. From this cartoon a working drawing is then made showing each separate piece of glass. The working drawing is then put into the hands of the cutter, who makes patterns of paper of each piece of glass to be cut. After these patterns are made they are stuck on a glass easel and the work of sketching and cutting begins. This is a delicate operation, as the cutter must match the colors of the glass to correspond with the artist's colored sketch and many changes are necessary before the exact shade is found.

Thirteenth century. Île de France.

Following this operation the artist goes over each separate piece of glass with a brush carefully tracing the outline of the drawing. When this is done the entire work is waxed upon a large sheet of plate glass, when further retouching by the artist must be done in order to bring the assembled fragments into a perfect whole. The glass is once more taken apart and fired in a kiln under a temperature of about one thousand four hundred degrees Fahrenheit. After the color has thus been fused permanently into the glass it is taken out of the kiln and the entire work is laid over the working drawing and glazed. The vitral is then ready to be set in position.

The effect that may be obtained solely by the aid of leads is very happily shown in the vitrals of the delivery-room, wherein the arabesques, too thin in outline and too delicate in tracery to be done in colored glass, are made of sheet lead cut out and sweated on both sides of the glass. Great precision is needed in cutting out and applying this metal lace. After disposing the lead along the outline of the ornament a tracing is taken from the working drawing and placed over sheet lead. The cutter then follows the tracing and cuts through the sheet lead, following the lines of the design. The cut-out sheet lead is then sweated on the outline lead already in place and the whole is given a surface of tin and lead to stiffen and consolidate the entire applique.

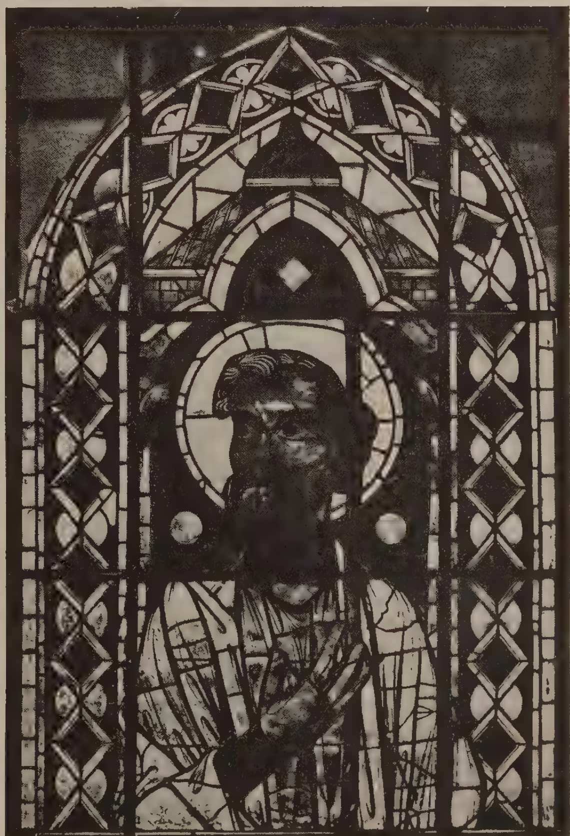
The oldest vitrals in existence date back to the eleventh century and are preserved in the Tegernsee Abbey, in Bavaria, but aside from the interest attached to them on account of age they are not particularly remarkable. Even in the windows of the twelfth century, of which good examples remain in the Angers Cathedral and the Abbey of St. Denis near Paris, there is a crudeness in the drawing which mars the general effect and the leads frequently startle the eye by their appearance in unexpected parts of the composition. It is not until we consider the magnificent vitrals of the Chartres Cathedral, which date back to the thirteenth century, that we get a full appreciation of what the artists of the Middle Ages accomplished.

Although there are good examples of thirteenth-century vitrals in the cathedrals of Rouen, Reims, Amiens, Bourges, Strasbourg, Paris, Canterbury, Salisbury, Toledo, and Cologne, the cathedral of Chartres is the real treasure-house for the painted glass of this golden age of the art. There are one hundred and twenty-five large windows at Chartres in which the effect produced by the skilful play on the three primary colors, red, blue, and yellow, is nothing short of marvellous. When we consider the paucity of means at the disposal of the artists of that day compared with the palette available to the glass-painter of the present generation, we are made very humble indeed. When we compare with the results which they so laboriously obtained the effects which are now produced with ease through the employment of a score or more of tints and shades obtainable through the advance made in the science of chemistry, we must admire these inspired creators of beauty who, although equipped with insufficient tools, yet managed to turn out so many masterpieces.


CHARTRES CATHEDRAL, THIRTEENTH CENTURY.


REIMS CATHEDRAL, SOUTH NAVE.


AMIENS CATHEDRAL, CHOIR WINDOW.


BOURGES CATHEDRAL.

In those days, and until the passing of the monarchy in France, the art was in the keeping of impoverished nobles to whom certain dispensations were accorded in exchange for their engaging in the work. They had the privilege of cutting all the timber necessary for the operating of their kilns in the royal forests. They were exempt from all taxes and could wear a sword. No apprentice could be employed unless he belonged to the family of the glassmaker or were of noble blood.

Although Chartres marks the apogee of the art of painted glass, there are superb vitrals of a subsequent date that continue through the fourteenth, fifteenth, and sixteenth centuries the noble traditions of the artists of the Chartres Cathedral. Some remarkable fourteenth-century windows are preserved in the cathedrals of York, Strasbourg, Beauvais, Orvieto, and in Merton Chapel at Oxford.

Rouen Cathedral.

The best examples of fifteenth-century vitrals are those of the Evreux, York, Riom, and Tours cathedrals, while the cathedrals of Rouen, Bourges, Metz, Litchfield, Winchester, Borgos, Seville, Toledo, and Reims are rich in vitrals of the sixteenth century.

Although the painted glass of the seventeenth century suffers by comparison with that of the preceding period, there can be found here and there some examples in which composition and coloring are of the highest artistic value. The vitrals of the Troyes library, of the Bourges cathedral, of the Strasbourg library, and of Oxford University are of this quality.

There has been painted glass of a sort produced since that period, but the French Revolution and the Napoleonic wars caused a hiatus in the demand that was followed by a reduction in the supply. In 1840, when the French Government decided to restore the neglected Gothic cathedrals, the demand was revived and eventually the supply. A series of experiments were conducted at Sèvres, notably by Broquiert, to rediscover the process of making pot glass, and the modern art of painted windows dates from this renaissance.

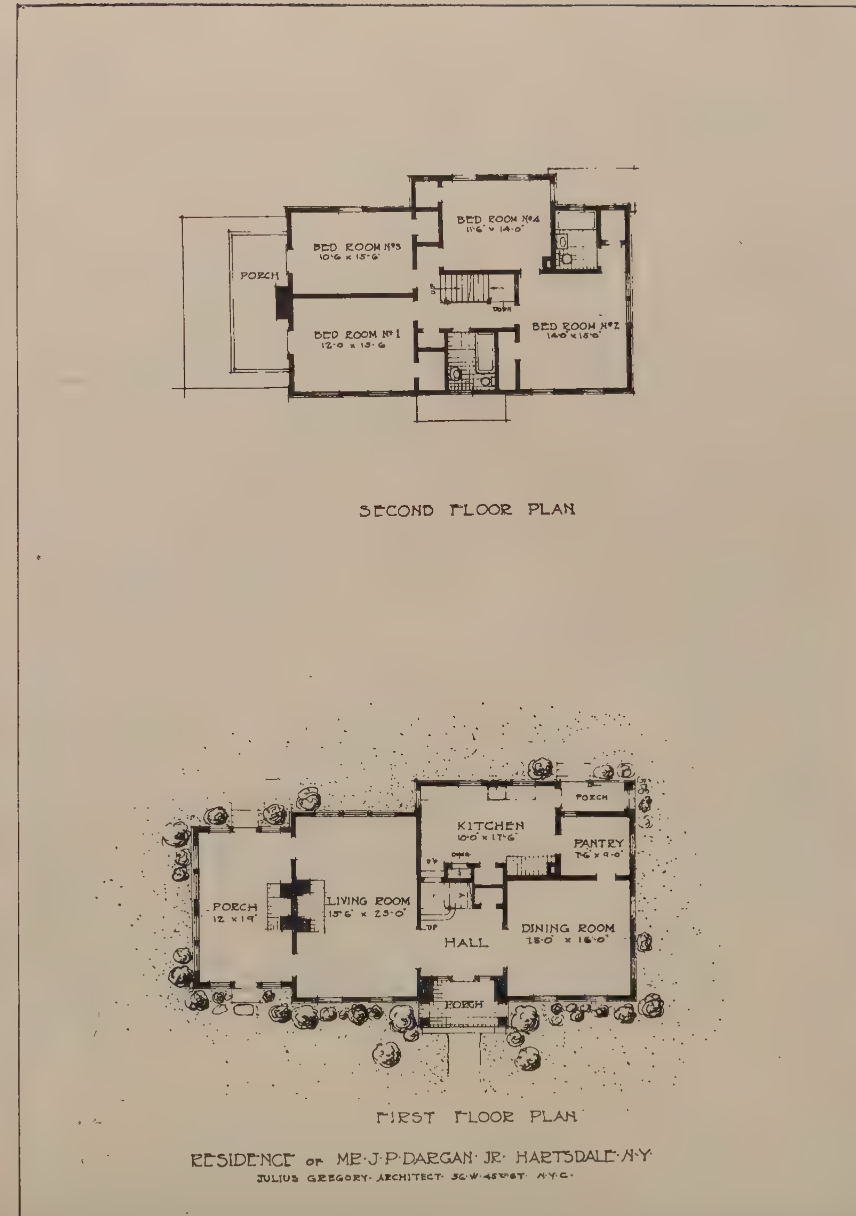
To-day we have all the materials, all the tools that the masters of the Middle Ages had, and a number of new colors and shades, to say nothing of improved machinery and processes, all that we need is their eye and hand and possibly a greater love.

Modern adaptation of Italian Renaissance, Detroit Public Library.
Cass Gilbert, Architect. W. Francklyn Paris and Fred'k J. Wiley.

RESIDENCE, J. P. DARGAN, JR., HARTSDALE, N. Y.

Julius Gregory, Architect.

ENTRANCE DETAIL.



Julius Gregory, Architect.

RESIDENCE, J. P. DARGAN, JR., HARTSDALE, N. Y.

Building Supervision

By Richard P. Wallis

PART II

Specifications

THE purpose of the specification is to provide the contractor with the information he needs, relative to the building operation which he is to undertake, that cannot readily be shown on the plans. The specifications, together with the plans and contract, form what are known as the "contract documents," and when signed by owner and contractor become binding obligations for both. The architect should, in the preparation of the specifications, exercise the same scrupulous care that goes with the preparation of the working drawings. The contractor uses the specifications in much the same manner as he does the plans, both for purpose of estimating and building, and the same arguments in favor of clearness and conciseness may be cited as were discussed in the paragraphs touching on the preparation of plans.

Specification writing has never received the same attention that has been accorded the preparation of plans, possibly owing to the relative greater prominence of the latter. Architects have been satisfied to "muddle through" a job with inconclusive specifications, regarding them as a necessary evil rather than a possible aid to them in their work. Little effort has been made until comparatively recently to standardize the terms and methods employed in expressing these requirements of the architect. This lack of recognition of the value of the specifications seems somewhat strange when it is considered that the contractor is expected to commit himself to a definite cost for the execution of the work contemplated, based in part on the information contained in the specifications. If this information is obscure and contradictory it is obvious that it will be extremely difficult to obtain a just estimate of the real cost.

The American Institute of Architects have sought to eliminate much of the uncertainty existing in specification writing by the preparation of the so-called "General Conditions of the Contract." This is a document consisting of some forty-five paragraphs dealing with the more general requirements common to most building operations and representing the best legal and technical advice available. These paragraphs are in such form that they may be incorporated wholly or in part in the individual specifications.

The ability to write a competent specification presupposes a technical knowledge of materials and their uses together with a natural capacity for detailing the nature of the various requirements in clear and concise English; added to which should be the ability to arrange the subject-matter of the exposition in such form as to entirely eliminate the possibility of omission or duplication of effort on the part of the contractor. These qualifications should preferably be based on the writer's personal experience and observations.

An analysis of the requirements of the specification shows that: first, the work of the various trades should be discussed in the specifications in as nearly the same order as possible as that followed by the contractor in the field; and, second, that different classes of work to be done by the contractor should be first listed and then described. The object of the first suggestion is not only to aid the contractor in the execution of his work through the presentation of the work of the various trades in a logical sequence, but to induce in the mind of the writer an orderly method of thought that will greatly aid him in his effort to visualize and systematize the problem he has undertaken in all its ramifications. The writer should, with the aid of a check-list, make a careful study of the plans, elevations, details, and other expressed requirements of the owner, at the same time going over in his own mind the information that the contractor will need to permit of his execution of the contract in strict accordance with the wishes of the architect. He should endeavor to place himself in the position of the contractor, who, without previous knowledge of the requirements, is engaged in the erection of that particular bit of work, and should assure himself that he has answered conclusively the questions that will normally be raised by the contractor both in estimating and in building.

The specification writer will find that the preparation of a skeleton outline will be of assistance to him in his work. This outline may take the place of a check-list and should consist of a tabulation of the various trades and their subdivisions incident to a completed building. This list may be prepared beforehand, covering practically all phases of building construction in their sequence. The writer, in referring to this list, notes that certain items on the outline should be included in the specification he is preparing, and so proceeds to include them, properly elaborated.

The process of listing consists simply of collecting together the various items, under each subheading of each trade, that are to be constructed in a particular manner or from the same material and which may be covered by a single paragraph of description. The advantage sought in so grouping these items and separating them from the ensuing description is to simplify the make-up of the specification and so tend to eliminate errors and omissions on the part of both architect and contractor. The description, as its name implies, is merely the definition of the materials and methods that the contractor is to use on that particular work included under the corresponding listing.

The specification should be typed on standard, legal-sized, light-weight paper and bound in a heavy paper cover with the title of the specification, name of job, architect's name and address, and the date printed thereon. The original sheets should be backed up by the use of an additional sheet of carbon placed with the carboned face next to the back of the original sheet in order to permit of blueprint copies being made of the specifications. It is sometimes more convenient to make additional sets of prints where only a few extra copies are required than to have the entire document retyped.

The supervisor is vitally interested in the make-up and character of the specifications, as it usually devolves on him to pass on the quality of the finished work and his tribulations increase or decrease in an inverse ratio to the competency of the specification.

The following suggestions are based upon experience

in the field and the writer hopes that they may prove to be of some real benefit.

In passing it might be fitting to remark that the best training for the specification writer would be for him to undertake the supervision of work based on specifications prepared by himself. This is seldom possible and he must be content with applying the experience of the supervisor to the preparation of future specifications.

Such minor matters as wrong punctuation, incorrect spelling, and other typographical errors may, while in themselves unimportant, affect the entire meaning of the sentence or paragraph in which they occur and thus cause the specification to say something entirely foreign to the thoughts of the writer. Specifications should be carefully proof-read in order to prevent such contingencies arising.

The dictates of good grammar should be strictly observed in paragraphing the subject-matter of the specification. The individual paragraph should discuss but one subject or a group of closely related subjects. To attempt to include two or more subjects in the same paragraph having little or nothing in common, violates both the rules of good usage and good specification writing. Such a paragraph is misleading and confusing to the contractor and may lead to the omission of some important item that, had it been properly placed in a paragraph by itself, would have attracted the attention of the contractor both in estimating and in building.

Frequently addenda are added to a specification to include those changes decided upon too late to permit of their inclusion in the body of the specifications. These addenda should be dated in the proper sequence and should be bound to the set of specifications to which they refer.

The specifications should be correctly indexed and should have this index incorporated with them. A detailed index greatly enhances the value of the specification to both architect and contractor, as it facilitates ready reference to the subject-matter and so tends to prevent the omission of essential items.

The writer should exercise extreme care in the use of the phrase "or equal" common to so many specifications. The use of this or of equivalent phrases in specifying materials frequently admits of an attempt on the part of the contractor to substitute an inferior article. If the writer is wholly competent it will not be necessary for him to resort to this evasion, as he will specify two or more materials which are entirely acceptable to him and will thus save the supervisor a large amount of unnecessary argument with the contractor as to just what constitutes "or equal." The writer should bear in mind throughout the advantages gained by the use of a positive, rather than a negative, character of specification.

The work of the various trades should be cross-referenced where necessary so that there will be no possibility of evasion on the part of any of the subcontractors on the plea that certain work was not mentioned in their section of the specifications. It devolves upon the general contractor in any case to see that all work included in the specification is carried through, but it should not be necessary to rely on this fact to secure a complete and satisfactory installation.

The work of one trade frequently requires work of another, particularly in the installation of mechanical equipment. These various specifications are usually prepared by different writers, and unless they are carefully compared to see that all necessary work is included there is a possibility that some important detail may be overlooked. For instance, the ventilating specifications cover the furnishing and setting of motors for the fans, but the wiring-up of these motors is done by the electrical contractor. Mention of this fact should be made in the electrical section of the specification as well as in the ventilating section. Otherwise this item will be lost and it may be with difficulty that the general contractor will be prevailed upon to have this connection made.

Frequently the specifications call upon the owner to do certain work or furnish certain materials or equipment for the contractor to install. Under such divided responsibility the specification needs to be very explicit as to the amount and character of the work to be done by both parties. The owner should be insured against the possibility of the contractor's having included in his contract cost-work that he, the owner, is to undertake. Such duplication of cost is apt to arise unless the specification divides up the work to be done in such a manner as to eliminate all question of confusion.

Frequently it is deemed expedient by the architect to designate a lump sum allowance to cover the cost of certain equipment rather than to attempt to detail minutely the necessary requirements. This refers particularly to such items as finished hardware and lighting fixtures where considerable latitude is sought by the architect in making his selection and where it would be difficult to make the final choice at the time the specification was written. This provision should contain a clause stating that the contract sum is to be adjusted in conformity with all debits and credits resulting from such transactions. Care should be used in the wording of this clause to clearly indicate what the aforesaid cash allowance is to cover—whether it means the cost to the contractor (in which case he would be entitled to add a percentage for overhead and profit) or the cost to the owner (in which case the overhead and profit would be already included in the contract sum). This precaution is necessary in order to avoid duplication of the cost of the contractor's overhead and profit.

The preparation of a room schedule may serve to aid in the writing of a complete specification. This should consist of a list of the various rooms with notes as to the finish or special features in each case. This list is useful in checking to see that nothing has been omitted and also is of interest to the supervisor in seeing that the work is carried out by the contractor as specified.

When certain standard building material is specified, such as cement, lime, reinforcing or structural steel, or any of the materials covered by standard specifications, it is generally advisable to refer to such specifications rather than to attempt to prepare minute descriptions of such materials. The standard specifications prepared by the American Society for Testing Materials are generally recognized and accepted as the best authority obtainable in such matters. The specification writer should avail himself of such information by inserting a clause in his specification to the effect that "this material shall be in accordance with the specification for ——, Serial No. ——, prepared by the American Society for Testing Materials." That the materials are in accordance with these specifications may be established by tests made in properly equipped testing laboratories.

A method used by some architects and engineers in specifying the grade of concrete on important work, fixes the strength to be developed by the concrete within a certain time after mixing, thereby putting it up to the contractor to produce concrete of the required quality. This method has certain advantages in that the responsibility for the quality of the concrete is placed where it belongs and in such a manner as to be difficult of evasion. Con-

crete that does not develop the required strength within the time limit set is not as specified, and the supervisor is left no course but to condemn it and the contractor no alternative but to remove such defective material.

Some offices, in specifying underground work, state that the contractor shall guarantee his work to be waterproof. This places the responsibility for the workmanship involved upon the contractor in such a manner as to make it difficult, if not impossible, to evade. Since good concrete is very essential to a waterproof job this method may be said to embody certain advantages.

Where it is desirable to use the product of a particular manufacturer, it would be well to either quote the manufacturer's specification in full or to insert a paragraph referring to the particular specification.

Jurisdictional disputes among the various trades have always been a source of extreme annoyance to the owner and architect as well as to the contractor, insomuch as the great majority of these disputes arise over matters entirely beyond the control of either party to the contract. Work is stopped and sometimes the entire job is shut down on account of these disputes and the owner and contractor made to suffer by virtue of conditions over which they have no responsibility or control.

In an effort to bring this intolerable condition to an end, the Associated General Contractors, the American Institute of Architects, the Engineering Council, the National Building Trades Employers Association, and the Building Trades Department of the American Federation of Labor have met and by a joint resolution have agreed, among other provisions, that the architect or engineer shall state in his specifications, and the contractor in his contract, that wherever organized labor is recognized as such, that all trades must abide by the awards of the National Board of Jurisdictional Awards, and that any trade or trades failing to do so shall forfeit their local charter and shall receive no support from the other trades. If this provision is carried out it will eliminate nearly seventy per cent of current labor disputes and will go far to expedite building construction. The architect or engineer would do well to consider this matter while drawing up his specifications.

The aim throughout the preparation of specifications should be the elimination of extras. Certain extras are caused by new requirements which arise after work is under way. These are to be expected but cannot be provided for in advance. The extras made necessary by incomplete plans and inconclusive specifications should, however, be foreseen and should be rigorously guarded against by proper preliminary supervision.

The relation of the so-called preliminary supervision to the actual or construction supervision is obvious. A poor presentation of the essential job requirements throws a considerable amount of unwarranted additional responsibility on the architect's supervisor and entails greater cost and less satisfaction to the owner than if the requisite amount of attention had been applied to checking the subject-matter and arrangement of the specification.

Announcements

Willfred D. Holtzman, Jr., desires to announce that the partnership of Holtzman & Paterson, architects, has been dissolved. Mr. Holtzman will complete the unfinished work of the firm, and continue the general practice of architecture at 406 Flynn Building, Des Moines and Adel, Iowa. Catalogue and samples are requested for the Des Moines office.

We have received the handsome catalogue showing "Architectural Metal Work for Modern Buildings," as produced by the Flour City Ornamental Co., Minneapolis, Minn.

The monthly bulletins published by the Atlantic Terra Cotta Co. make a valuable addition to the architect's reference library. The January number contained a number of fifteenth-century examples from photographs by Mr. F. C. Hirons of Dennison & Hirons, the well-known designers of banks.

Walter E. Ware, A. I. A., formerly of the firm of Ware, Treganza & Cannon, architects, and Ware, Treganza, Cannon & Lamb, landscape-architects, and Slack W. Winburn, diplôme Ecole des Beaux-Arts de Toulouse, France, announce their association as architects and landscape-architects under the firm name of Ware & Winburn, 610 Utah Savings & Trust Building, Salt Lake City.

Harold S. Kaplan, architect, formerly with Stevens & Lee, is now practising architecture at 298 Dundas St. W., Toronto, Ont., in association with A. Sprachman under the firm name of Harold S. Kaplan & A. Sprachman, architects. They desire to receive building literature and catalogues.

Alvan E. Small, member A. I. A., desires to announce to his clients and friends that he has associated with him Mr. John J. Flad and that they shall retain their offices in the Ellsworth block, Madison, Wis., and continue the practice of architecture under firm name of Alvan E. Small, architect and John J. Flad, associate.

Messrs. Pendleton S. Clark and Walter R. Crowe, announce the formation of a partnership for the practice of architecture under the firm name of Clark & Crowe, with offices in the Krise Building, Lynchburg, Virginia. Manufacturers' catalogues and samples requested.

Weston & Ellington, architects and engineers, announce the opening of their offices, Suite 1507 Stroh Building, Detroit, Mich., January, 1923, for the practice of architecture and engineering in all its branches. They invite consultation on all building problems and assure their clients of the personal attention of the members of the firm.

Mabel Keyes Babcock, landscape-architect, M. I. T., '08, late director of the landscape department of the Breck-Robinson Nursery Company, Lexington, Mass., announces that her connection with that company ceased December 30, 1922. With a competent staff and favorable connections Miss Babcock is prepared to undertake the planning and execution of landscape work of all descriptions from her office in Boston, 138 Bowdoin Street, near State House, between Beacon Street and Ashburton Place.

Webber, Staunton & Spaulding, architects and engineers, 1017 Hibernian Building, Los Angeles, Calif., announce the formation of a partnership, with firm name and address as above.

(Continued on page 110)

Drafting-Room Mathematics

By DeWitt Clinton Pond, M.A.

FIFTH ARTICLE

FOR the purpose of demonstrating the use and the methods of application of certain trigonometric formulas, it will be interesting to construct a triangle of such dimensions as may seem practical, and to use certain of the common formulas in order to obtain the values of various unknown angles or dimensions. Let it be assumed that there is a triangle having sides which are 4, 5, and 7 units long, as shown in Fig. 21. Here is the triangle with the sides

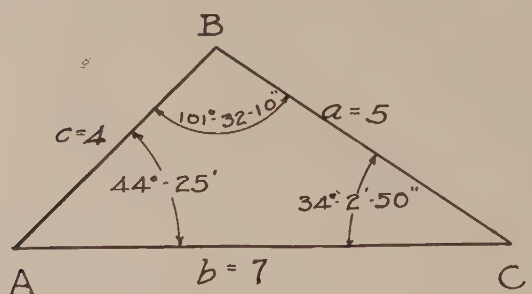


FIGURE 21

a, b, and c known, and it will be necessary to determine the value of the angles A, B, and C if all the facts regarding the triangle are to be found.

There are several formulas which will give the values of the angles, but the one developed in the last article will be used, simply for the purpose of demonstrating the various uses of this algebraic expression which has already been made use of. The formula is $a^2 = b^2 + c^2 - 2bc \cos A$. This can be changed to the following:

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

By substituting the values in the figure the formula becomes:

$$\cos A = \frac{16 + 49 - 25}{2 \times 4 \times 7} = \frac{40}{56}$$

A fraction like the one above is almost too simple to require the use of logarithms to obtain the cosine of the angle, but as the functions of angles are expressed more exactly in the tables of logarithms of functions than in the tables of natural functions in Smoley's "Parallel Tables of Logarithms and Squares," logarithms will be used to solve for the cosine of A.

$$\begin{aligned} \log 40 &= 1.60206 \\ -\log 56 &= 1.74819 \\ \log \cos A &= 9.85387 - 10 \end{aligned}$$

A = 44 degrees 25 minutes

There is another formula which gives actually the same result as above, and which is somewhat more simple under certain conditions. This formula is expressed in the following manner. Let $s = \frac{1}{2}(a + b + c)$. Then the sine of A can be found by the formula given below:

$$\sin \tfrac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}}$$

$$2s = 4 + 5 + 7 = 16$$

$$s = 8$$

$$\sin \tfrac{1}{2}A = \sqrt{\frac{(8-4)(8-7)}{28}} = \sqrt{\frac{4}{28}}$$

If the calculations are carried out by means of logarithms it will not be a very difficult matter to extract the square root of the fraction.

$$\begin{aligned} \log 4 &= 0.60206 \\ -\log 28 &= 1.44716 \\ \log \sin^2 \tfrac{1}{2}A &= 9.15490 - 10 \end{aligned}$$

$9.15490 \div 2 = 4.57745 - 5 = \log \sin \frac{1}{2}A$

$\frac{1}{2}A$ = 22 degrees 12 minutes and 30 seconds

A = 44 degrees 25 minutes

This result agrees with the one found above, and as both methods give the same result, it is left to the reader to select the one he would use.

So far only one angle—A—has been found, but both C and B can be found by the use of either formula given above. If the first is used, the calculations can be expressed as shown below:

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

$$\cos C = \frac{25 + 49 - 16}{2 \times 5 \times 7} = \frac{58}{70}$$

$$\begin{aligned} \log 58 &= 1.76343 \\ -\log 70 &= 1.84510 \\ \log \cos C &= 9.91833 - 10 \end{aligned}$$

C = 34 degrees 2 minutes 50 seconds

The angle B can be determined by adding A and C and subtracting from 180 degrees.

A =	44 degrees 25 minutes
$+ C$ =	34 degrees 2 minutes 50 seconds
	78 degrees 27 minutes 50 seconds
	180 degrees
−	78 degrees 27 minutes 50 seconds
B =	101 degrees 32 minutes 10 seconds

If it is desired to find B by substituting in the formula, the same result will be obtained, but it will be seen that as B is an obtuse angle the value of its cosine will be a nega-

tive quantity, and to obtain B it will be necessary for the reader to subtract it from 180 degrees.

All the sides and all the angles of the triangle are now known, and it will now be possible to use other formulas and check them with the results already obtained.

When two sides and an included angle are known it is possible to obtain the other two angles and the third side by means of formulas given in Kidder's "Handbook," with which all architects and engineers are familiar.

In this set of formulas it is assumed that the angle C and the sides a and b are known, and it is necessary to obtain A, B, and c. In order to do this it is first considered necessary to find the value of $\frac{1}{2}(A+B)$, and for this purpose the formula $\frac{1}{2}(A+B) = 90$ degrees $- \frac{1}{2}C$ is used. In the case under consideration C has been found to equal 34 degrees 2 minutes and 50 seconds, and one-half of this angle is 17 degrees 1 minute and 25 seconds. If this is subtracted from 90 degrees the result is 72 degrees 58 minutes and 35 seconds, which equals one-half of the sum of the other two angles of the triangle. The next step is to find $\frac{1}{2}(A-B)$, and this is given by the formula:

$$\tan \tfrac{1}{2}(A-B) = \frac{a-b}{a+b} \tan \tfrac{1}{2}(A+B)$$

It is only necessary to substitute the values which are already known in the second part of this formula to obtain the value of the tangent of one-half the difference of the two other angles. It will be seen that this difference is a minus quantity, which is proved by developing the calculations involved in working out the formula:

$$\tan \tfrac{1}{2}(A-B) = -\tfrac{2}{12} \times \tan 72 \text{ degrees } 58 \text{ minutes } 35 \text{ seconds}$$

$$\begin{array}{lr}
\log 2 & = 0.30103 \\
\log \tan 72 \text{ degrees } 58 \text{ minutes } 35 \text{ seconds} & = 0.51402 \\
\hline
 & 0.81505 \\
-\log 12 & = 1.07918 \\
\hline
 & 9.73587
\end{array}$$

9.73587 = log tan 28 degrees 33 minutes 30 seconds

One-half of the difference between the angles A and B is a negative angle of 28 degrees 33 minutes 30 seconds. This can be checked by actually subtracting the values already obtained for the angles.

The next step in carrying out the series of formulas is to determine the value of A and B. This is a very simple matter, as shown by substituting in the formulas given below:

$$A = \tfrac{1}{2}(A+B) + \tfrac{1}{2}(A-B)$$
$$B = \tfrac{1}{2}(A+B) - \tfrac{1}{2}(A-B)$$

The value of $\frac{1}{2}A + B$ has been found to be 72 degrees 58 minutes and 35 seconds, and the value of $\frac{1}{2}A - B$ has been found to be a negative angle 28 degrees 33 minutes and 30 seconds. By substituting these values in the formulas, the following results are obtained:

A = 72 degrees 58 minutes 35 seconds + (− 28 degrees 33 minutes 30 seconds) = 44 degrees 25 minutes 5 seconds
B = 72 degrees 58 minutes 35 seconds − (− 28 degrees 33 minutes 30 seconds) = 101 degrees 32 minutes 5 seconds

It will be seen that these values check approximately with those already obtained. The difference of 5 seconds in the result is accounted for by the fact that the tables are developed to the nearest minute, and the seconds must be determined by calculations.

The last formula is developed for the purpose of determining the value of c.

$$c = (a+b)\frac{\cos \frac{1}{2}(A+B)}{\cos \frac{1}{2}(A-B)}$$

$$\begin{array}{lr}
\log 12 & = 1.07918 \\
\log \cos 72 \text{ degrees } 58 \text{ minutes } 35 \text{ seconds} & = 9.46652 \\
\hline
 & 0.54570 \\
-\log \cos 28 \text{ degrees } 33 \text{ minutes } 30 \text{ seconds} & = 9.94366 \\
\hline
 & 0.60204
\end{array}$$

0.60204 = log 4 (approximately)

These formulas have been developed to show how it is possible to find the remaining side and angles when two sides and their included angle are known, by methods which are given in a standard handbook. The formulas which have been given so far can be used almost interchangeably.

Another formula which will be used in following calculations is developed to give the same result as those just given, and in order to show how it can be applied to a comparatively simple problem it will be used to check the values which have already been determined for the triangle shown in Fig. 21. The formula which will be used is

$$\tan A = \frac{a \sin C}{b + a \cos C}$$

It will first be necessary to determine the logarithms of a, sine C, and cosine C. $a = 5$, $b = 7$, and $C = 34$ degrees 2 minutes 50 seconds.

$$\begin{array}{lr}
\log a & = 0.69897 \\
\log \sin 34 \text{ degrees } 2 \text{ minutes } 50 \text{ seconds} & = 9.74809 - 10 \\
\log \cos 34 \text{ degrees } 2 \text{ minutes } 50 \text{ seconds} & = 9.91833 - 10
\end{array}$$

$$\begin{array}{lr}
\log a & = 0.69897 \\
\log \cos C & = 9.91833 \\
\hline
 & 0.61730 = \log 4.1429
\end{array}$$

$$7 - 4.1429 = 2.8571$$

$$\log 2.8571 = 0.45592$$

$$\begin{array}{lr}
\log a & = 0.69897 \\
\log \sin C & = 9.74809 \\
\hline
 & 0.44706 \\
 & -\ 0.45592 \\
\hline
 & 9.99114 \log \tan A
\end{array}$$

A = 44 degrees 25 minutes

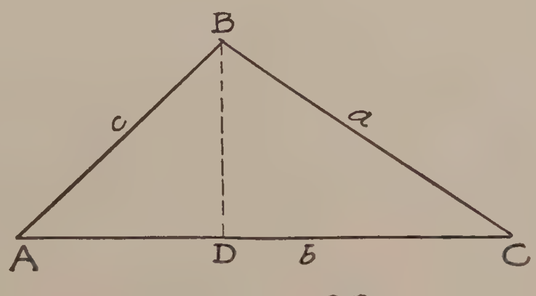


FIGURE 22

This result checks the value already determined for this angle. Of all the formulas given for the purpose of determining the value of some unknown angle or side when two sides and an included angle are known, the one given in the last article and used in the first part of this one is the most simple, as it can be used with the parallel tables of squares and logarithms. The squares of the sides of the triangle used in this article are discovered in such a simple manner that it is not necessary to refer to a table such as found in Smoley's very useful book, but the architect is not often confronted with such simple dimensions.

It is evident that there are several formulas which give the same result, and it is always a good principle to check calculations such as those given above. The methods which have been used can be applied to more complicated problems, different sides and angles being taken to prove the results obtained by the first calculations, and different formulas can be made use of. It is important that the values used to prove results should not be those determined by the first set of calculations.

As the formulas which have been given deal with the problems involved in finding various parts of an oblique triangle, it might be interesting to investigate the formulas for finding the area of such a triangle. It is fairly obvious that the area of such a triangle as shown in Fig. 22 is equal to one-half of the product of the base multiplied by the altitude. In the case of the triangle shown in the figure, the base is the side AC, or b. The altitude is BD, and the length of this is found by multiplying the sine of A by c. In other words, the area of the triangle is found by multiplying bc by the sine of A and dividing by 2. If two sides and the included angle of an oblique triangle are known, it is possible to find the area in this manner. In the triangle shown in Fig. 22, $b = 7$, $c = 4$, and A has been found to equal 44 degrees 25 minutes. bc in this case equals 28, and one-half of this product is 14. If this is multiplied by the sine of A, the result should be the area of the triangle.

$$\begin{aligned} \log 14 &= 1.14613 \\ \log \sin A &= \underline{9.84502} \\ & 0.99115 = \log 9.8 \end{aligned}$$

There is another formula which can be used for finding the area of an oblique triangle in case all three sides are known.

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

This formula can be used for the purpose of checking the result obtained above. As has been found in the first part of this article, s is equal to 8, and the formula may be developed as shown below:

$$A = \sqrt{8 \times 3 \times 1 \times 4} = \sqrt{96} = 9.8$$

This result checks with the one obtained before. This completes the list of formulas dealing with the solving of problems pertaining to oblique triangles. It may seem to the reader that this discussion has been largely theoretical, but in the following article it will be shown that the formulas given in this article and in the previous ones can be used in solving some very practical problems.

Meeting of the National Executive Committee of the American Institute of Architects at Charleston, S. C.

On Thursday, Friday, and Saturday, March 29–31, the National Executive Committee of the American Institute of Architects will hold their semi-annual meeting in Charleston, S. C. On the same dates, the South Carolina, North Carolina, Georgia, and Florida Chapters of the Institute and North Carolina Association of Architects will meet in Charleston for joint and individual sessions.

Matters of the greatest moment to the profession will be discussed, and a varied and interesting programme of entertainment is being prepared.

The programme for the three days of the convention:

First Day—Thursday, March 29

9.00 A. M.—General registration at the Convention Headquarters, in the Auditorium of the Charleston Museum, Rutledge Avenue at Calhoun Street.

10.00 A. M.—Joint session, Mr. N. G. Walker, president of the South Carolina Chapter, A.I.A., in the chair. Addresses of welcome by the mayor of Charleston and by Mr. Wm. C. Miller of the Carolina Art Association.

Response in behalf of visiting architects by Mr. W. B. Faville, president of the American Institute of Architects, and by Mr. Earl Stillwell of the North Carolina Chapter.

Executive session of the National Committee in the Colonial Room, north gallery of the Museum.

Joint session of the four State chapters, in the Auditorium. General discussion of the action taken at Charlotte in the convention of January, 1922; led by Mr. Harry Barton.

Report of progress on the Standard School Building Code and the State Highway Code, Messrs. C. C. Wilson and W. H. Lord, followed by general discussion.

New business.

1.00 P. M.—Luncheon in the South Room of the Museum.

2.00 P. M.—Cars, provided by the contractors and building supply dealers, assemble at the Museum.

Drive about the city, passing the more interesting buildings of the eighteenth and early nineteenth centuries, and visiting the Governor Bennett house.

Ten mile drive across James Island to Folly Beach for an oyster roast, supper, and smoker, as guests of the contractors and building supply dealers.

Second Day—Friday, March 30

10.00 A. M.—Separate sessions of the different chapters and associations for individual business, in various committee rooms of the Museum.

1.00 P. M.—Luncheon in the South Room.

2.30 P. M.—Cars assemble at the Museum. Drive through St. Andrew's Parish to Magnolia Gardens, stopping en route at Drayton Hall and the old St. Andrew's Church. The gardens should be at their best.

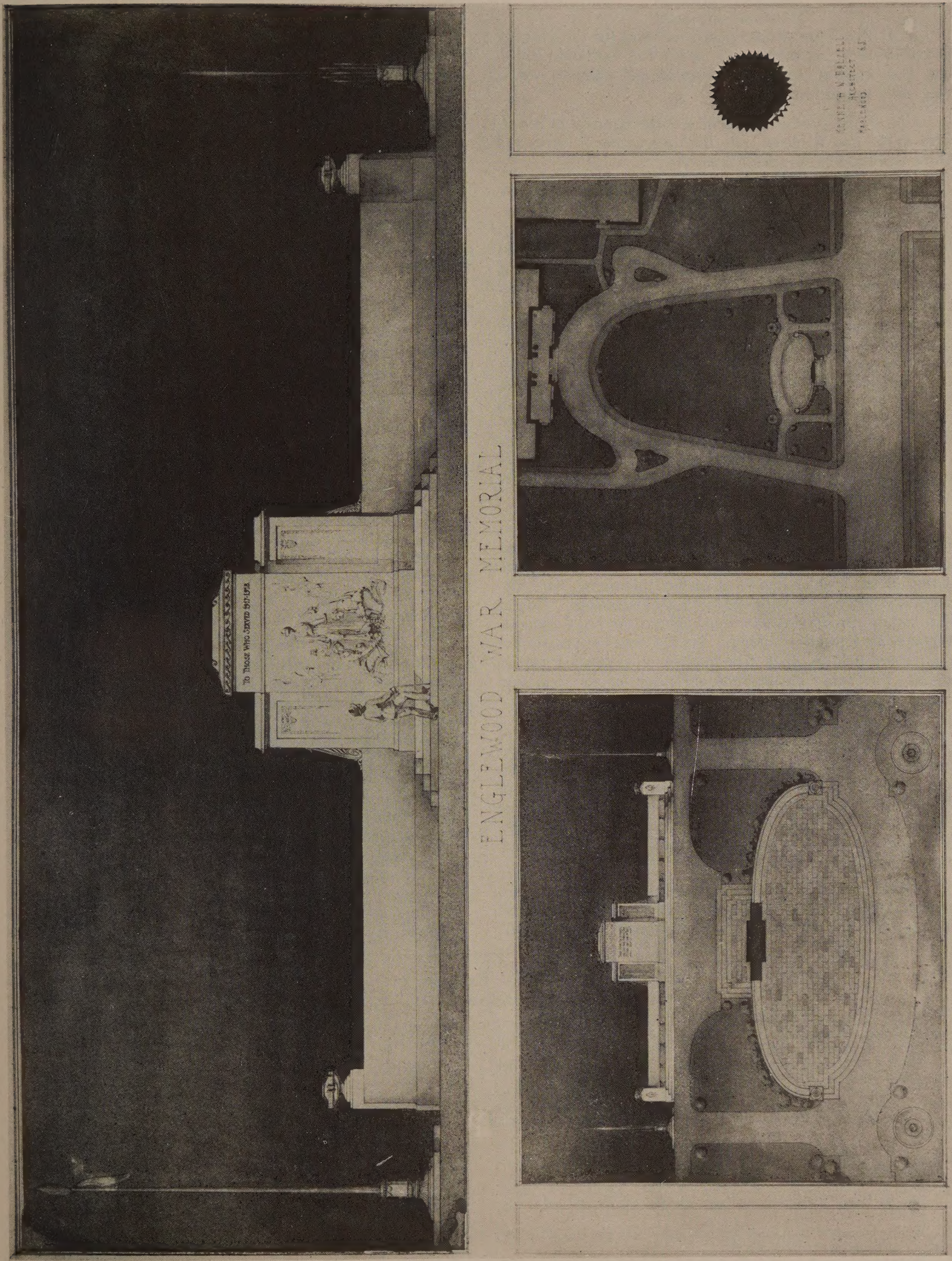
Third Day—Saturday, March 31

9.30 A. M.—Joint session, Mr. W. B. Faville, president of the American Institute of Architects, in the chair.

General discussion of the relation of the Institute to the chapters, and of the promised regional directorates, led by Mr. N. G. Walker, president of the South Carolina Chapter.

New business.

12.30 P. M.—Convention adjourns.



ENGLEWOOD WAR MEMORIAL.

Kenneth W. Dalzel, Architect.

Announcements

(*Continued from page* 105)

A. C. Zimmerman has opened an office for the practice of architecture and engineering at 417 San Fernando Building, Los Angeles, Calif. Catalogues and samples would be greatly appreciated.

Elmer Grey, architect, announces the removal of his offices to the new Bank of Italy Building corner Seventh and Olive Streets, Los Angeles March 1st.

The Glidden Company are sending out an attractive circular about the well-known Ripolin. Year after year seagoing craft of all types—from *The Farm* to luxurious ocean liners—prove the unequalled ability of Ripolin to withstand the most severe exposure. The marine test is a supreme test. Ripolin Enamel stands up on yacht hulls and liner cabins. It even protected the ship that conquered the Antarctic and enabled Amundsen to reach the South Pole. Surely such an enamel will give superservice *anywhere!* Ripolin has received the international indorsement of architects and decorators solely because of this superior combination of wearing qualities with lustrous beauty. Ripolin's reputation as an enamel paint of unmatched quality is creating a steadily increasing demand and widening its distribution throughout America. Now building owners in all sections can obtain Ripolin promptly, and with it many years of satisfaction.

The new Catalogue F, descriptive of Kohler enamelled ware is off the press, and its distribution has commenced among the trade. This catalogue constitutes a complete listing of the Kohler line of enamelled plumbing ware, fittings, and accessories, with appropriate illustrations. Bound in substantial and attractive blue buckram covers, Catalogue F makes an attractive volume. Its 215 pages of descriptive matter are printed on a fine quality of enamelled paperstock. The many illustrations are exceptionally clear and pleasing, and the vignettes are well reproduced.

The Hydraulic Society has gotten out a second edition of its pamphlet entitled "Trade Standards in the Pump Industry." This edition contains some additional tables and explanatory data, and also a revised list of members of the society. Copies may be secured from the members or the secretary, C. H. Rohrbach, 50 Church Street, New York, and if desired in quantities, will be supplied at cost of printing.

The Standard Conveyor Company is pleased to announce that it has acquired by purchase all the rights, titles, and patents pertaining to the well-known "Brown Portable" line of portable and sectional piling, elevating, conveying, loading, and unloading machinery for the handling of packed and loose materials. This line of machinery has been manufactured by the Brown Portable Conveying Machinery Company at North Chicago for ten years. Until further notice, the plant will be continued in operation by the Standard Conveyor Company, and all inquiries and correspondence regarding "Brown Portable" products should be addressed to Standard Conveyor Company, "Brown Portable" Products Plant, North Chicago, Illinois. They are also pleased to state that the organization which has so successfully developed portable conveying machinery, known the world over as the "Brown Portable" products for their merit, will continue with the Standard Conveyor Company in this line of work in which they are the originators.

W. H. Steiner has been appointed district engineer in charge of the Des Moines office of the Portland Cement Association, to succeed H. L. Tillson, resigned. This office, located in the Hubbel Building, has charge of Association work in Iowa. Mr. Steiner has been connected with the Portland Cement Association for the past three years, spending all that time in Iowa. Prior to joining the Association staff, he was city engineer of Marshalltown, Iowa, for ten years, and with railroad companies seven and one-half years. During the World War, Mr. Steiner served as first lieutenant of engineers.

That metal lumber may provide a practicable home-building material has been proved conclusively in an exhibit completed in Akron, Ohio, by the Berger Manufacturing Company, producers of Berloy products. The proof is a two-story metal house—the first of its kind in America—which was constructed by Berger experts to show that metal-lumber construction has reached a perfected stage.

The McAlear Manufacturing Company, 1901–7 South Western Avenue, Chicago, Illinois, have ready for distribution a new 128-page catalogue, known as No. 27, which illustrates many new devices, including an individual temperature-control valve, specialties for all power plants, vacuum and vapor heating systems, oil-refining and water-works plants, plumbing systems and marine service, together with illustrations showing their application and use. The individual temperature-control valve is self-contained and can be applied to any radiator, old or new, without additional piping other than the supply and return. When the thermostatic member is set for the desired room temperature, it automatically controls the opening and closing of the valve. The catalogue contains a very comprehensive detailed description of all specialties. Sent upon request.

Book Reviews

(*Continued from page* 92)

"I had also before I was twelve travelled much with my father and mother by stage-coach, canal, and steamboat, visiting West Point, Trenton Falls, Niagara, Quebec, Lake George."

There is an amusing paragraph revealing him as something of a Tom Sawyer; he evidently put his reading and literary talent to good usage.

"I suppose these readings developed the talent which I must have temporarily possessed two or three years later, when I could hire other boys to do my chores by telling them stories—no doubt but partially of my own invention."

CHEATING THE JUNK-PILE: THE PURCHASE AND MAINTENANCE OF HOUSEHOLD EQUIPMENTS. By Ethel R. Peyser. With an Introduction by Richardson Wright. Illustrated by drawings by Harry Richardson and photographs. E. P. Dutton & Co., Publishers, New York.

Buying household equipment is like buying stocks and bonds, and demands expert and experienced advice.

Such matters as the use of electricity, the housekeeper's wizard of all work, gas cookery, oil-stove cookery, keeping it cool, refrigerator rules, plumbing, bathrooms, everything that concerns comfortable and efficient housekeeping, are discussed from the point of view of experience, not of theory.

It is a book that might well have a place in the library of every young couple intending to build this spring. It would save a lot of guessing.

STATUES OF NEW YORK. By J. Sanford Saltus and Walter E. Tisné. With eighty-two full-page photogravures. G. P. Putnam's Sons, New York.

The late J. Sanford Saltus was a generous patron of the arts, and he gave of his large means for its advancement in many ways. Among the city's notable statues is that of Joan of Arc by Miss Hyatt, given by Mr. Saltus.

The text of this book is a commentary on "the Memorials erected within the City of New York from 1770 to the present-day. There is no attempt to appraise the statues as works of art," and for this we may be grateful. Happily the good need no praise; the bad, let them speak for themselves. Such a book serves a useful purpose as a record, and is not without considerable historic interest.

From the drawing by M. A. Spencer.